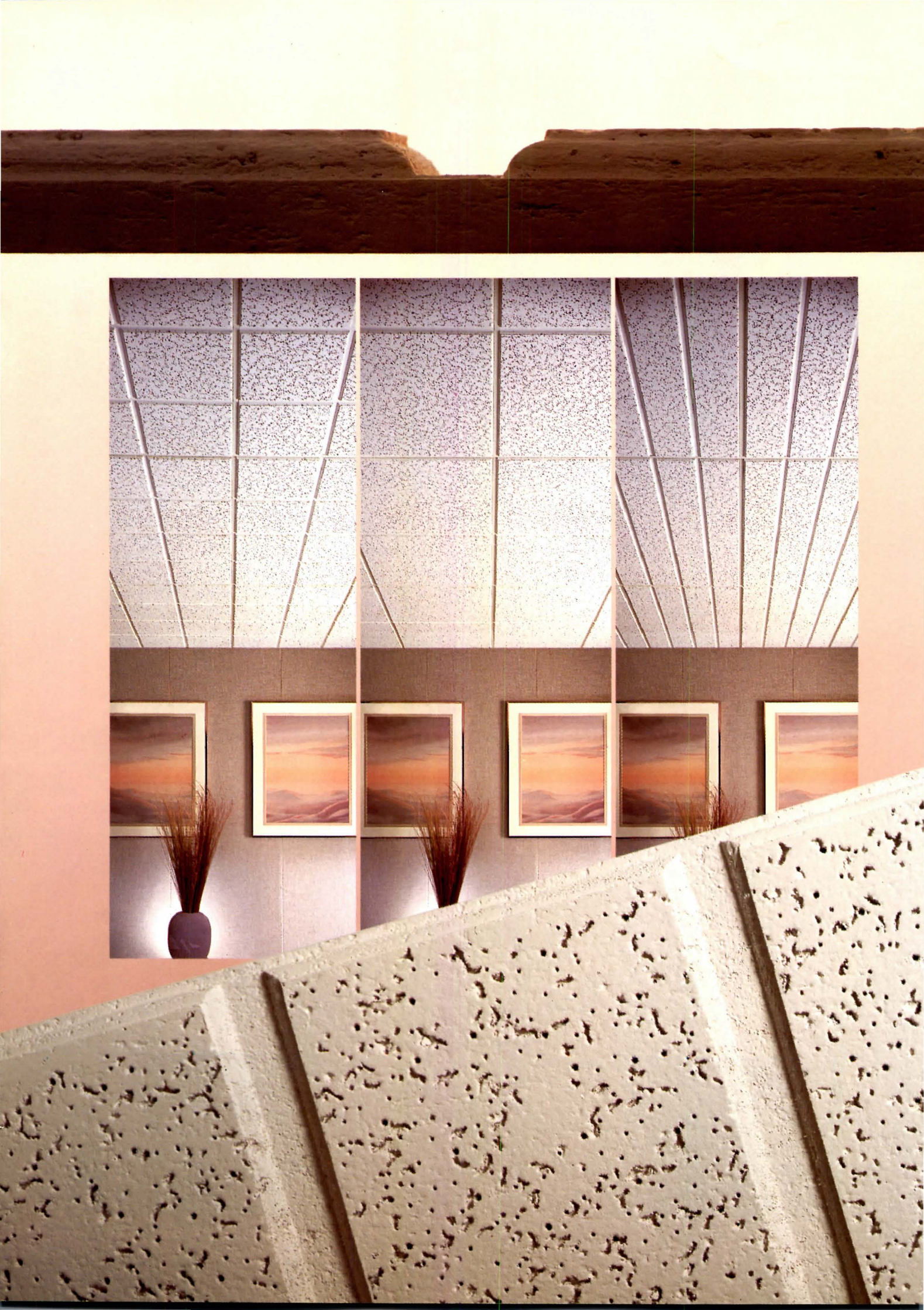
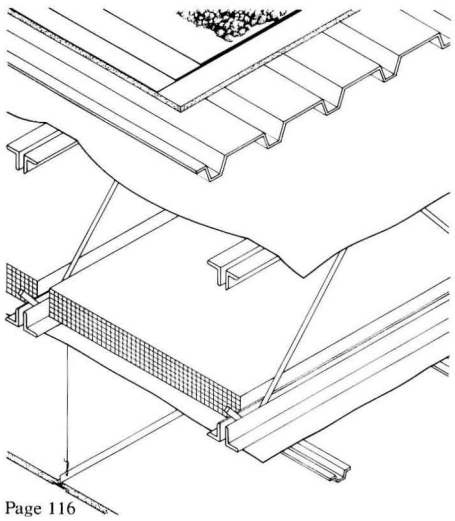
RCHITECTURE

Incorporating Architectural Technology September 1987 Ten Dollars




MArch
INTERGRAPH
INTERGRAPH



Page 116

Technology & Practice

Page 110

Cover
The Picasso Museum in Barcelona by Jordi Garcés and Enric Sòria (see page 60). Photograph by Lluis Casals.

CONTENTS

Page 50

Page 68

World Architecture

ARCHITECTURE, publication number ISSN0746-0554, official magazine of The American Institute of Architects, is published monthly by the American Institute of Architects at 1735 New York Ave. N.W., Washington, D.C. 20006. **Individual subscriptions:** U.S. and its possessions: $35 for one year, $53 for two years, $70 for three years. Canada: $41 for one year, $61 for two years, $80 for three years. Foreign: $59 for one year, $101 for two years, $143 for three years. Single copies, $5 each (except for May and September issues, which are $10). Publisher reserves the right to refuse unqualified subscriptions. For subscriptions: write circulation department, ARCHITECTURE, 1735 New York Ave. N.W., Washington, D.C., 20006; allow eight weeks. Quotations on reprints of articles available. Microfilm copies available from University Microfilm, 300 N. Zeeb Road, Ann Arbor, Mich. 48106. Referenced in The Architectural Index, Architectural Periodicals Index, Art Index, Avery Index to Architectural Periodicals. Second class postage paid at Washington, D.C., and additional mailing offices.

VOL. 76, NO. 9.

Artran™ ceilings. One small detail remains unseen.

The finely scaled patterns and contoured edges are quickly apparent. However, one attractive detail escapes the eye.

This ceiling is acoustical.

Through exclusive design technology, Artran achieves good NRC performance without fissures, holes or deep scoring. And at a price only slightly higher than conventional, tegular-edged ceilings.

For free samples and literature, call 1 800 233-3823 and ask for Artran.

Armstrong

Circle 3 on information card

Aluminum Architectural Moldings That Relieve Stress!

nouncing the new Fry Reglet Plaster Control Screed (2-Pc) – wo-piece extruded aluminum plaster molding that is both ıctional and pleasing to the eye.

e Fry Reglet Plaster Control Screed (2-Pc) provides these ique benefits:

A functional movement joint: The molding allows plaster to move more freely, to relieve stress and cracking.

Design enhancing feature strip: Accentuates or creates exterior design lines.

Color complement or contrast: The Plaster Control Screed (2- Pc) can be painted or anodized to complement or contrast with stucco finish.

Styrofoam spacers: Moldings are supplied with styrofoam spacers to facilitate alignment during installation, and are installed as a single unit, thus reducing "on the job" labor.

e Plaster Control Screed (2-Pc) features:

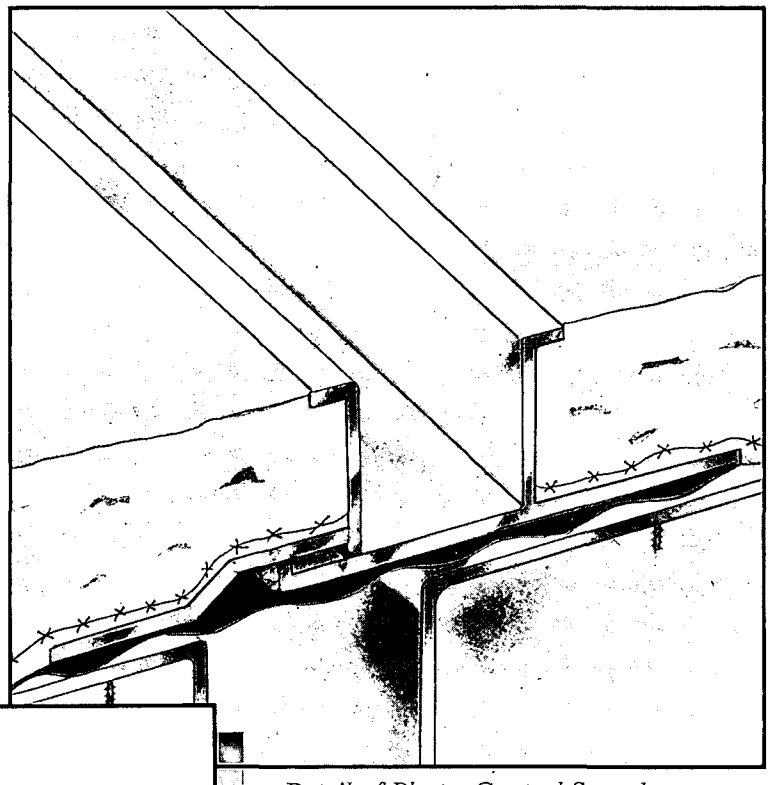
Durable two-piece molding made from extruded aluminum.

Reveal and ground dimensions compatible with standard Fry Reglet plaster moldings.

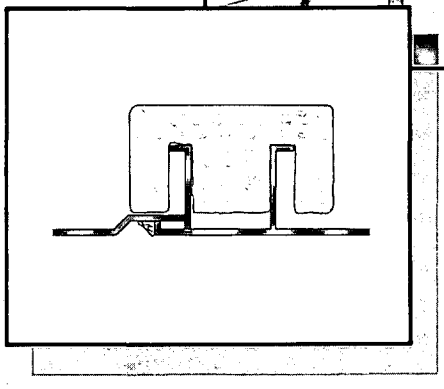
Variety of stock finishes including clear or color anodized, stock or custom paints, chemical conversion coating.

's new Plaster Control Screed (2-Pc) adds ctional beauty to your Design.

get plenty of rest, drink lots of fluids d call Fry in the morning.



Detail of Plaster Control Screed



Plaster Control Screed with Styrofoam spacer

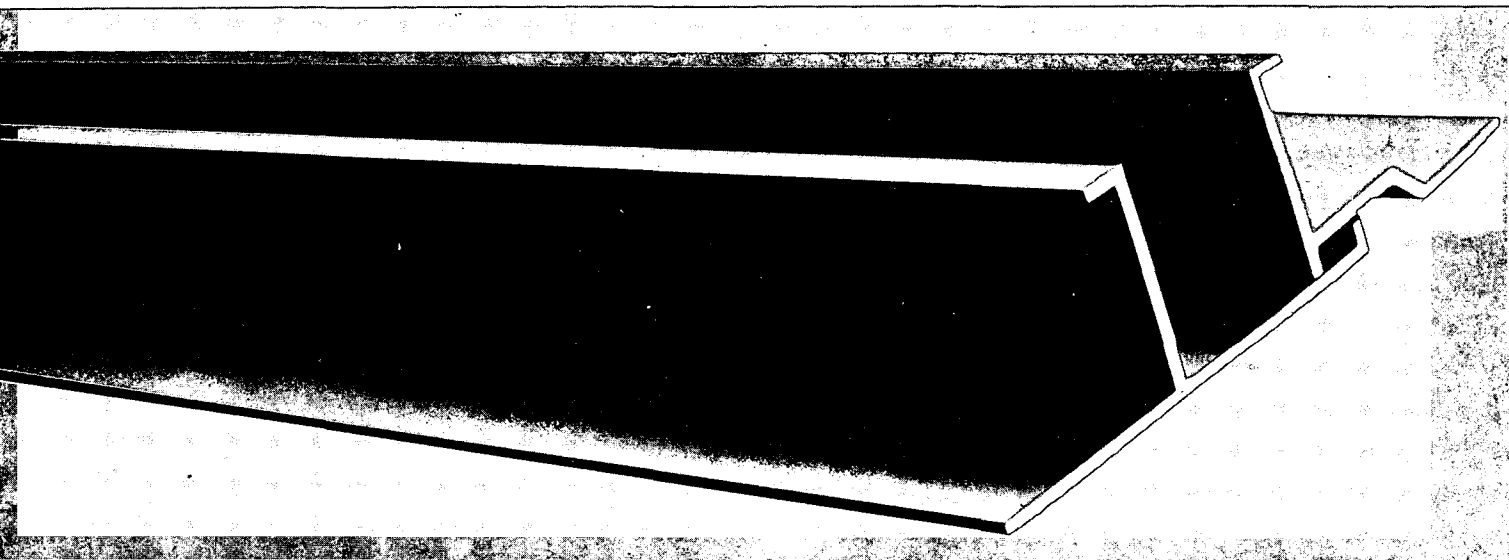
FRY REGLET®

625 S. Palm Avenue
Alhambra, California 91803 **(818) 289-4744**

2777 Peterson Place
Norcross, Georgia 30071 **(404) 441-2337**

Look for us in Sweets Catalog. 09200/FRY

Circle 6 on information card



EVENTS

Oct. 3-6: Conference of the Council of Educational Facility Planners, Edmonton, Alberta, Canada. Contact: John Kulba, CEFP/I, 9th Floor, Devonian Building, Edmonton, Alberta, Canada T5K 0L2.
Oct. 4-8: World Congress of Building Officials Conference, London. Contact: Pauline Secker, Conference Secretary, Incorporated Association of Architects and Surveyors, Jubilee House, Billing Brook Road, Weston Favell, Northampton, England NN3 4NW.
Oct. 5-7: National Trust for Historic Preservation Conference, "Main Street: National Town Meeting," Washington, D.C. Contact: Linda Glisson, NTHP, 1785 Massachusetts Ave. N.W., Washington, D.C. 20036.
Oct. 5-8: Sheet Metal and Air Conditioning Contractors' National Association Convention and Exposition, Toronto, Ontario, Canada. Contact: SMACNA, P.O. Box 70, Merrifield, Va. 22116.
Oct. 7-10: IDCNY Fall Market Week, New York City. Contact: Fern Mallis, IDCNY, 29-10 Thomson Ave., Long Island City, N.Y. 11101.
Oct. 7-10: AIA Committee on Architecture for Justice Conference, "Back to Basics: Strategies for the 21st Century," Columbus, Ohio. Contact: Mike Cohn at Institute headquarters, (202) 626-7366.
Oct. 8-11: Conference on Public Art in America '87, Philadelphia. Contact: Laura S. Griffith, Fairmount Park Art Association, 1530 Locust St., Suite 3A, Philadelphia, Pa. 19102.
Oct. 14-16: International Symposium on Solving Corrosion Problems in Air Pollution Control Equipment, Buffalo, N.Y. Contact: National Association of Corrosion Engineers, P.O. Box 218340, Houston, Tex. 77218.
Oct. 14-16: Convention of Society of Piping Engineers and Designers, Houston. Contact: SPED, 1 Main St., Suite N-723, Houston, Tex. 77002.
Oct. 15-16: AIA Building Performance and Regulations Committee Conference, examining how better codes can result in better buildings, Boston. Contact: Dave Bullen at Institute headquarters, (202) 626-7448.
Oct. 17-19: AIA Committee on Design Conference, examining the theme of "Southernness" and the relationship of architectural design to culture, Natchez, Miss. Contact: Maurice Payne at Institute headquarters, (202) 626-7429.
Oct. 17-21: AIA Committee on Architecture for Health Conference, including sessions on technology design and "Negotiating with the Hospital Client," Cleveland, and Ann Arbor, Mich. Contact: Mike Cohn at Institute headquarters, (202) 626-7366.
Oct. 18-21: Prestressed Concrete Institute's Convention, New Orleans. Contact: Sheryl Blecha, PCI, 175 W. Jackson Blvd., Chicago, Ill. 60604.
Oct. 19-23: Course on the Application of Infrared Scanners to Detect Building Energy Losses and Roof Moisture, Burlington, Vt. Contact: Paul Grover, The Infraspection Institute, 33 Juniper Ridge, Shelburne, Vt. 05482.
Oct. 21-23: Architectural Woodwork Institute's Convention, Los Angeles. Contact: Elaine Bell, AWI, 2310 S. Walter Reed Drive, Arlington, Va. 22206.
Oct. 23-24: Program on Jefferson—Architect of the American Version, San Francisco. Contact: Elaine Thornburgh, Humanities West, 580 Funston Ave., San Francisco, Calif. 94118.
Oct. 25-28: National Electrical Contractors Association Exposition, San Francisco. Contact: Lawson Hockman, NECA, 7315 Wisconsin Ave., Bethesda, Md. 20814.
Oct. 27-29: Exhibition on Advancing Technology and Understanding of Automatic Guided Vehicle Systems, Pittsburgh. Contact: William J. Clayburg, Material Handling Institute, 8720 Red Oak Blvd., Charlotte, N.C. 28210.
Oct. 27-30: Asbestos Abatement in the Federal Government Conference and Exhibition, Kansas City, Mo. Contact: Kim Heck, Education Division, Hall-Kimbrell Environmental Services, 4840 W. 15th St., Lawrence, Kan. 66046.

LETTERS

Exposed Rebars in Mexico: In your article "Neighborhoods Rise from the Rubble" [July, page 78] concerning reconstruction after Mexico City's earthquake of 1985, the authors say, "Steel reinforcement was left exposed to reassure families of the safety of the new units. . . ."

Having been raised on the U.S.-Mexico border and with the opportunity to travel rather extensively through our neighbor to the south, I have found this phenomenon of exposed reinforcing steel to be typical throughout Mexico for well over 30 years. The explanation I got was that the homeowner avoided paying certain taxes by declaring the building "unfinished." The story went along the line that, until the reinforcing bars were covered, the building was not officially ready to be added to the tax rolls. If this story is accurate (and I tend to believe it over the authors' reporting) it could expose one of the reasons that Mexico's economy and government are where they are now.

Gordon E. Landreth
Corpus Christi, Tex.

Housing 'Assemblage': In art, "assemblages" are works comprising disparate and arresting fragments joined together to form unified compositions that impart provocative messages. The July issue of ARCHITECTURE is a splendid assemblage. Whether this happened by chance or design, it is difficult to say. If by chance, the issue is a triumph; if by design, it is a work of art!

Nora Greer's "Housing for the Poor: Losing More Than We Build" is an arresting fragment. Though its message is not new, it captures our attention by confronting us with unforgettable facts. For instance, in 1995, 900,000 units of moderate-priced housing will have disappeared into the abyss and 18.7 million will be homeless. Its lucid message about the paradox of contemporary America is provocative: ostensibly the world's richest nation, nevertheless she is too poor in will and imagination to devise strategies for housing her needy.

Another arresting fragment is Allen Freeman's "New York's First, and Perhaps Best, Public Housing," about a gem from the Depression. Indeed, America was poor then. Yet, in contrast with today, she retained sufficient will and imagination to realize such distinguished projects.

Following Freeman, Anne Ferebee's and EduardoTerrazas's story "Neighborhoods Rise from the Rubble" is an inspiring fragment about how earthquake-battered Mexico reconstructed 40,000 housing units in 12 months, start to finish, spending $1 million each day to complete 130 units. Concurrently, in the United States we were losing 308 units and propagating 6,400 homeless daily (interpretation of Greer). Moreover, photographs illustrating the text reveal that public housing does present opportunities for inventive design and benefits from the attention of distinguished architects.

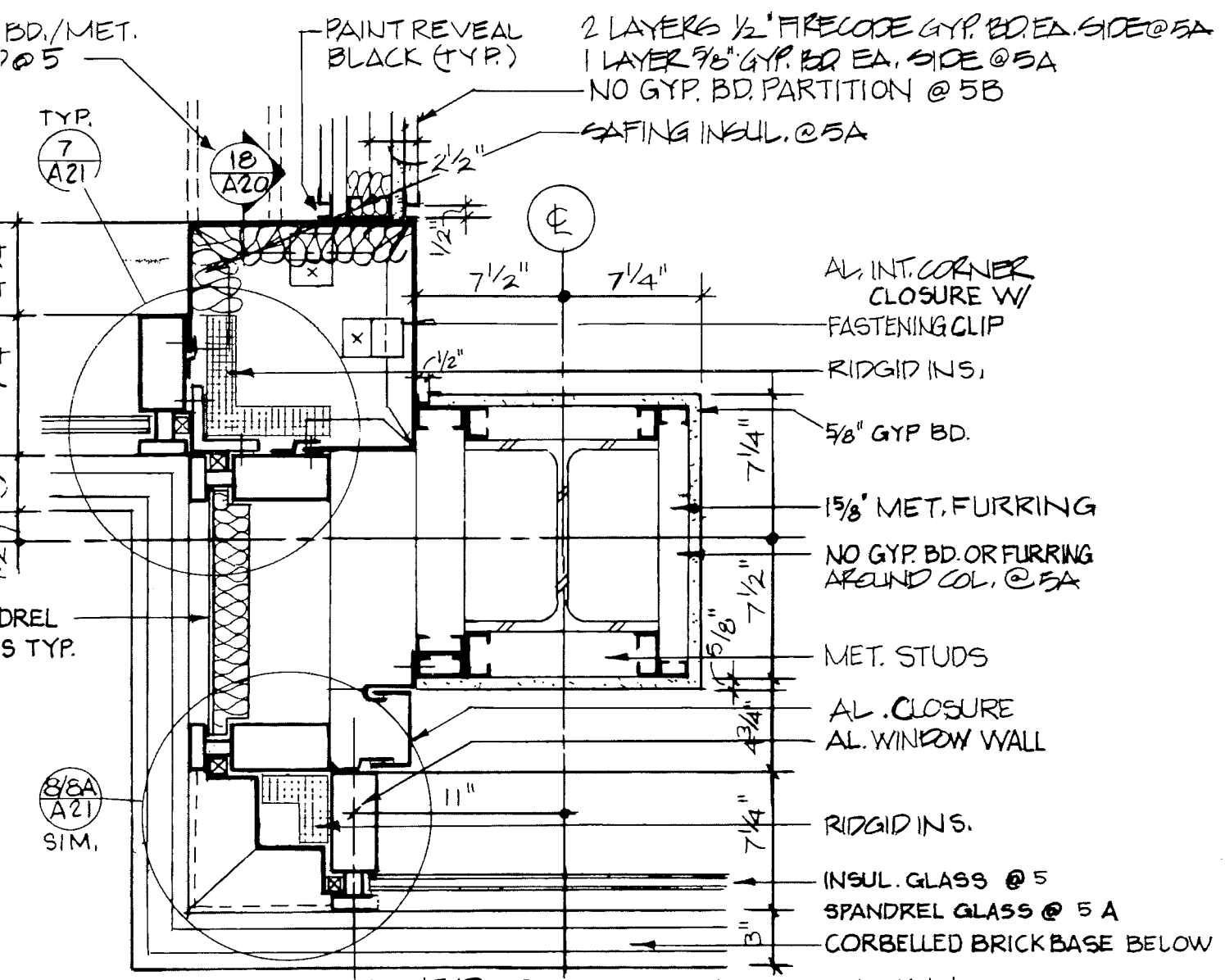
Finally in this series, Christopher Arnold and Henry Legorio report in "Chinese City Starts Over After the Quake" how earthquake-leveled Tangshan was rebuilt in nine years to accommodate 250,000 people.

Assembled, these four fragments impart a provocative message about America's view of civilization contrasted with that of Mexico or China: the former country often portrayed in our press as underdeveloped and corrupt, and the latter, well, what can it be? After all, it is communist! However, the July '87 ARCHITECTURE shines overall because of seven featured fragments juxtaposed alongside the housing stories, pieces showing off eccentricities and conceits devouring American architecture today.

One wonders if it was by editorial artifice or a spin of fortune's wheel that one hears whispered, "Rome burned while Nero fiddled"? In either case, the denouement of this intriguing issue is the photography accompanying Lee Ryder's article in the Interiors section, which reminds one of Marie Antoinette's anguished cry to her loyal entourage before being beheaded (or, perhaps, precisely because she already had lost her head). This picture cries out to the same loyal design fans who inhabit Greer's America: if we can't give the people affordable housing, then why not give them ruins?

Bravo!

Ashok Bhavnani, AIA
New York City



NEWS

Overseas

Mixed Reviews for Berlin's International Building Exhibition

After eight years of residential design and construction in its inner city, Berlin's International Building Exhibition (IBA) has come to an end. Will it be considered a milestone in the history of architecture, similar to the 1929 Weissenhof housing development in Stuttgart? Will the IBA assume the significance of a manifesto?

Hardly. Although competitions among some of the world's best architects sought optimal solutions, and although the IBA was generously supported by the German government—and thus not subject to the financial restrictions that faced the architects in 1929—the exhibit proved only to be a confirmation of what is, not a vision of what could be in the future.

The European response to the IBA somewhat obscures this fact. Was the exhibition, in effect, only a grand propaganda show for Berlin and for a specific architectural trend? Many critics of the IBA have made just such a claim: the exhibition merely repeated that which had long since been conceived—and built—elsewhere. The IBA's greatest success, they feel, was simply managing to get many renowned architects to make a common effort in reconstructing parts of Berlin's inner-city districts.

That only reconstruction was considered, rather than a concept of comprehensive urban planning, must be ascribed to the philosophy of the exhibition's initiators. They wanted to abandon the ideology of the '60s and its negation of urban coherence and continuity. They wanted to cure mistakes made in the past.

This approach wasn't always successful. Too many individual design concepts by various architects prevented a successful integration of new with existing structures. Importing personal/individual architectural forms into a wholly different cultural environment is, at best, problematic. Arata Isozaki's apartment house near the Berlin Museum illustrates this. One can classify the design as interesting, or typically Isozaki, but the building neither relates to the "genius loci" nor stimulates new forms of construction or housing.

Berlin's exhibition also offered other than postmodern architecture, in part related to the city's vital modernism of the '20s. Such work can be seen in the large apartment block by Kollhoff/Ovaska near the Berlin Museum, in an infill design by Hilmer/Sattler, in Kurt Ackermann's honeycomb-like apartment house between Mies van der Rohe's National Gallery and

Left, Moore Ruble Yudell's 'Loire Chateau' in Tegal; above, an infill building by Hilmer/Sattler. Above right, Gustav Peichl's phosphate scrubbing plant; right, Japanese architect Arata Isozaki's apartment house.

ames Stirling's science center, as well as
n Gustav Peichl's phosphate scrubbing
lant. All not only quote the modernism
f the '20s but draw extensively from its
implicity, austerity, and modest inte-
gration into the surroundings.

The rehabilitations and modernizations
n the district of Kreuzberg also belong
o a category outside postmodernism. The
work is more important for general urban
unctionalism and the well-being of the
ffected residents than is the prominent
rchitecture created by famous names.

A few individual buildings also stand
ut like birds of paradise in an architec-
ural desert. One of these rarities is the
'Loire Chateau" in Tegel, by Moore
Ruble Yudell. Many architects reject it as
itsch, others admire it because it has
scaped the depressing monotony of so-
ial housing projects. Whether it helps
dvance the art of housing construction
s questionable.

Ultimately, though, a huge city like Ber-
in can absorb and amalgamate many dif-
ferent types of architecture. Fortunately
o. What remains is a variety of buildings

that are contradictory and experimental—qualities many architects produce in their attempts to offer only the best (and that is always only one "best" of many). The fact that the IBA brought such a wide spectrum of architectural concepts to Berlin is ultimately its greatest service to the city. It finally banished the routine architecture characteristic of the postwar years.—PAULHANS PETERS

Dr. Peters is editor of Baumeister *in Munich.*

UIA Congress Warned Against 'Superstar Seduction'

To help solve housing needs, especially those of the homeless, architects should concentrate less on design than on enabling communities to devise their own solutions. That was the overriding message of the 16th UIA congress, held July 13-17 in Brighton, England. The congress was organized by the RIBA, whose president, Rod Hackney, urged architects to adopt community architecture and self-build solutions.

"We must not be seduced by international superstars whose solutions cannot be applied in other countries," Hackney warned. Superstar Richard Rogers, Hon. FAIA, meanwhile, told an overflow audience that "architects are losing control of the design and construction of buildings." Far less well attended were many of the concurrent sessions on the congress's theme, "Shelter and Cities—Building Tomorrow's World," which aimed to contribute to the United Nations' International Year of Shelter for the Homeless.

Despite some disturbing, even dire, pronouncements and predictions, the tenor of the congress was largely upbeat. It was set by keynote speaker Ranasinghe Premadasa, prime minister of Sri Lanka and author of the U.N. initiative on the homeless. His country is singular in giving top priority to housing among its development programs, in succeeding in its goal of creating 100,000 new houses between 1977 and 1983, and in being on target in its five-year plan to produce 1 million dwellings between 1984 and 1989.

"Our motto is minimum state intervention and maximum people's participation," said Premadasa. His is a program of minimum assistance and minimum standards for the many rather than ample assistance and high standards for the few. The cost per urban dwelling is only $325, per rural house $210. Premadasa called on architects to help by developing new materials and ways of building that reduce costs and maintain quality; by creating designs that "are culturally and climatically compatible"; by evolving "simple methods of construction that less educated people can use themselves"; and by showing governments inexpensive ways to renovate and maintain buildings in inhospitable climates.

Self-help principles—in which the state acts not as provider and director but in an enabling and supporting role, helping people obtain land, financing, know-how, and scarce building materials—have been accepted by the World Bank, International Monetary Fund, other policy makers, and urbanologists.

One reason is the sheer magnitude of the growing problem. Around the globe there are 1 billion homeless people, as many as live in the entire industrialized world, or one-quarter of the world's population. And the number of homeless is expected to double by the end of the century. The vast majority, comprising one-quarter to one-half the population of Third World cities, live in squatter settlements where their illegal status and insecure tenure make them subject to deprivations and exploitation of every kind, including price gouging.

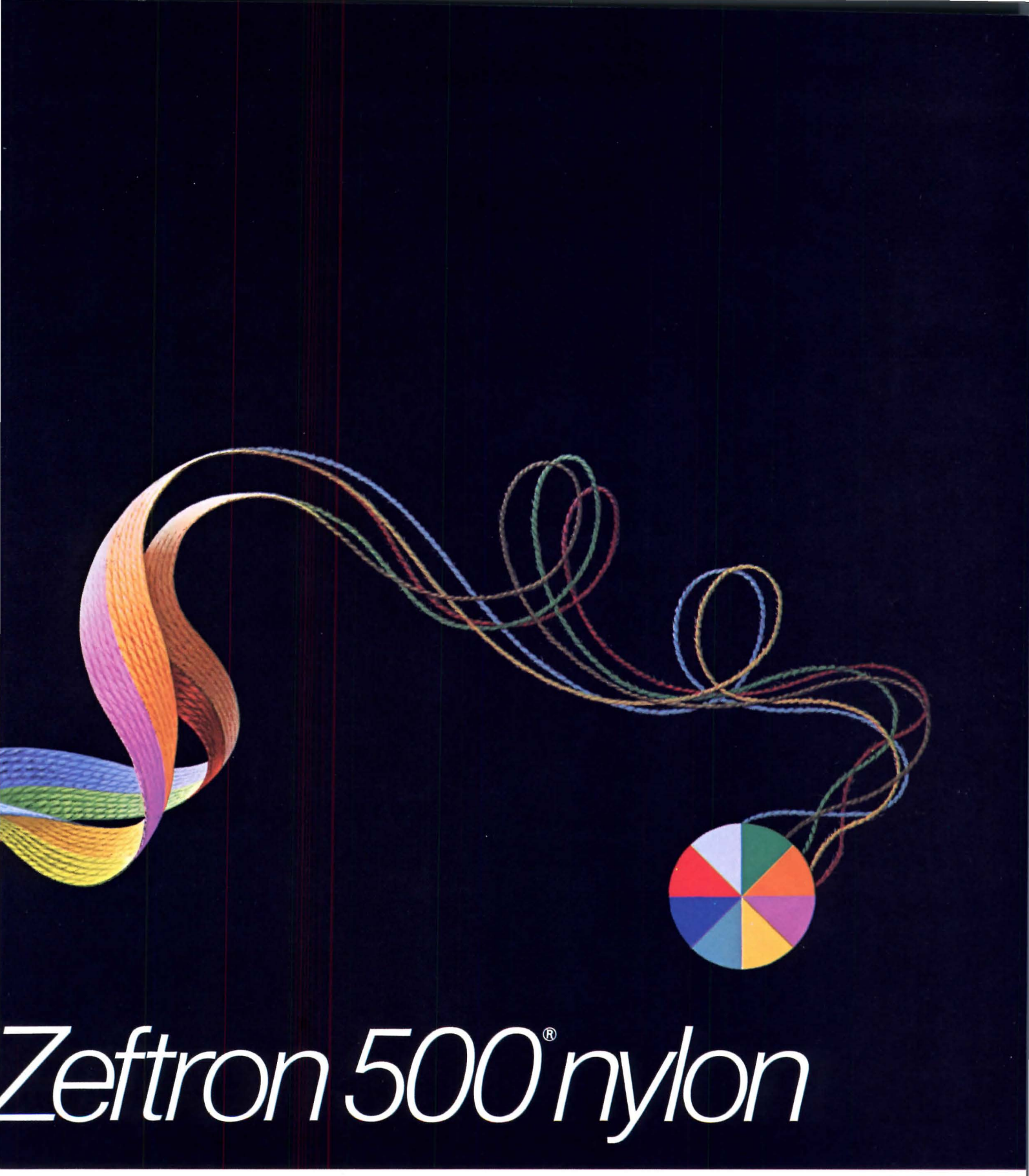
The congress agreed with Ingrid Munro, director of the U.N.'s housing initiative, that "merely changing the law to make squatting legal would solve many problems at source." Munro told the congress, "The challenge is to accept and upgrade slums. The city of tomorrow is being built by the poor. It's up to us to learn from them."

Another reason for the prevailing belief in self-help and self-build is that, like their people, the majority of national and city governments are becoming increasingly impoverished. The conviction is that, as British planner John Turner said, "When people have access to primary resources and the self-confidence to use them, they do far more with much less than either market- or state-based systems."

The failure of mass state-based programs in the '60s and '70s is still another source for the trend toward self-help as "the principal way in which the necessary scale of shelter can be provided," according to Munro. Moreover, the prevailing ideology, which favors regional and local solutions and esthetics over often inflexible planning imposed from above

continued on page 22

The fiber with authority? (Associated Space Design relied on Zeftron 500® nylon.) High-performance fiber for an energy efficient office complex? Associated Space Design put down versatile carpet tiles and matching broadloom with Zeftron 500 nylon because it met toughest specifications for color



onsistency and performance. Zeftron 500 nylon tiles are solution dyed
r long-lasting color. Dye lots are limitless. Tiles can be easily inter-
hanged and replaced. Zeftron 500 nylon keeps Tennessee Valley
uthority running very smoothly. Fibers for every way of life.

BASF Corporation
Fibers Division

BASF

Circle 10 on information card

Overseas *from page 19*
and/or abroad, assumes that self-help with its reliance on local materials, technologies, and talents will generate better solutions.

Sociologist and urbanist Janet Abu-Lughod of Northwestern University was among several at the congress who blamed planners for "sanitizing and falsifying" cities, robbing them of the "unexpected." Or, as British city planner Walter Bor said, planned intervention is acceptable only when taken "from the historical and local context."

That self-build—or community architecture, or whatever you wish to call it—isn't a cure-all was fully recognized by many delegates. Among its many potential shortcomings is that inflation of land prices tends to squeeze out the poor, with new urbanites and businesses taking over previous slum areas. Some delegates therefore insisted on the need for redistributing wealth rather than maintaining "systems serving the elite," in Abu-Lughod's words. "Grass roots on barren plains won't grow," she insisted.

Moreover, other needs precede those of housing, including secure land tenure, a pure water supply, adequate disposal of human wastes, ability to make a living. "Then, maybe, comes the house," which is often sold to meet other needs, explained Philip Arctander of the Nordic National Section. This points up one of several major difficulties in engaging the poorest people in self-build activities. A final question asked by some delegates was whether governments might be using community architecture to evade responsibility.

The architect's role in self-help programs requiring minimal design, direction, standards, and technologies is problematic at best. Arctander noted that such programs ask architects to become like China's barefoot doctors (part doctor, part farmer), with a role more political and administrative than architectural. "We must learn," he explained, "not so much about local building materials as about local values and priorities." The congress's Brighton Declaration stated that architects can help by "joining in the global campaign to raise the level of political awareness and strength of will, through the harnessing of public opinion," by "offering their skills as 'enablers' rather than 'designers.'"

Among the potential problems with this new, broad-based, missionary role for architects is that it is unlikely to "attract the majority of architects, who usually come from middle-class, white-collar families and have been reared in a well-serviced environment," as Australian planner B. S. Saini put it. And aren't sociologists, economists, or urban anthropologists better suited to the role? Also, unless architects have political power to go along with political commitment, they will be hamstrung, making promises they can't deliver.

In the end, the U.N.'s International Year of Shelter for the Homeless was "intended to heighten the awareness and stimulate response to the plight of millions of people." By this measure, the UIA's recent congress was a success.

Among the congress's other activities was the granting of awards. It bestowed its gold medal this year on Reima Pietilä, Hon. FAIA, of Finland, who, in a lecture, talked about the influence of nature on his work and concluded that "modern architecture is very young and will take time to be accepted."

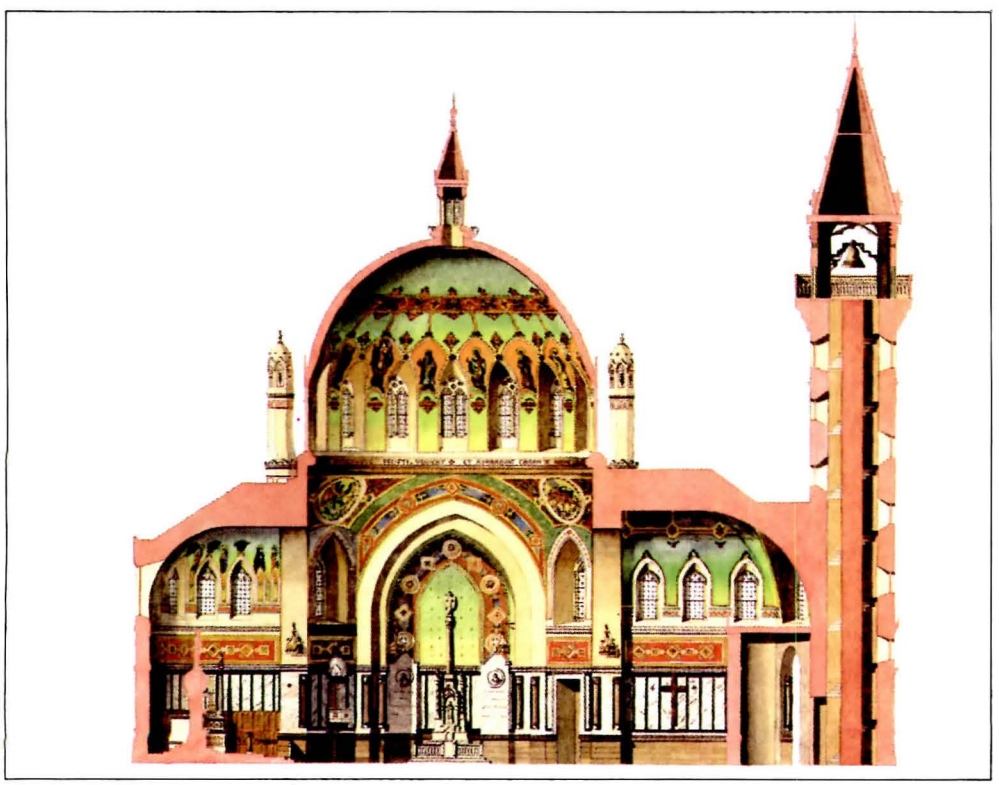
The Sir Patrick Abercrombie prize for town planning was awarded to AIA's regional urban development team (RUDAT). The Sir Robert Matthew prize for improvements to human settlements went to Mexico City in recognition of its work after the recent earthquake. Ada Louise Huxtable, Hon. AIA, and Norway's Christian Norberg-Schulz were jointly awarded the Jean Tschumi prize for architectural criticism/education.

The International Committee of Architectural Critics (CICA) drew substantial audiences at its three meetings during the congress. Of particular interest were CICA's choices of the best 10 buildings of the last three years. Topping the list was Norman Foster's Hong Kong/Shanghai Bank; next came Richard Rogers's Lloyd's bank in London; third place went to Gottfried Böhm's Zublin headquarters in Stuttgart.

A subject of great interest at the congress was the effect of *glasnost* on the Soviet architectural profession. It has been dramatically restructured as a result of freer elections that brought a fresh team to prominence at the Soviet Institute of Architects. The new president, Yuri Platonov, represents the "new wave" among Soviet architects and has strong support among younger practitioners and students. The previous president, an appointed hard-line traditionalist, received little support in the recent elections and is no longer involved in institute affairs.

Challenged in a CICA meeting to explain why he chose a bastion of capitalism, Lloyd's bank, to head his list of best buildings, Vyacheslav Glazichev of the U.S.S.R.—articulate, outspoken, often witty—retorted, "It's a bank now, but it might be anything else in 10 years. I choose it because I like it."

—Andrea Oppenheimer Dean



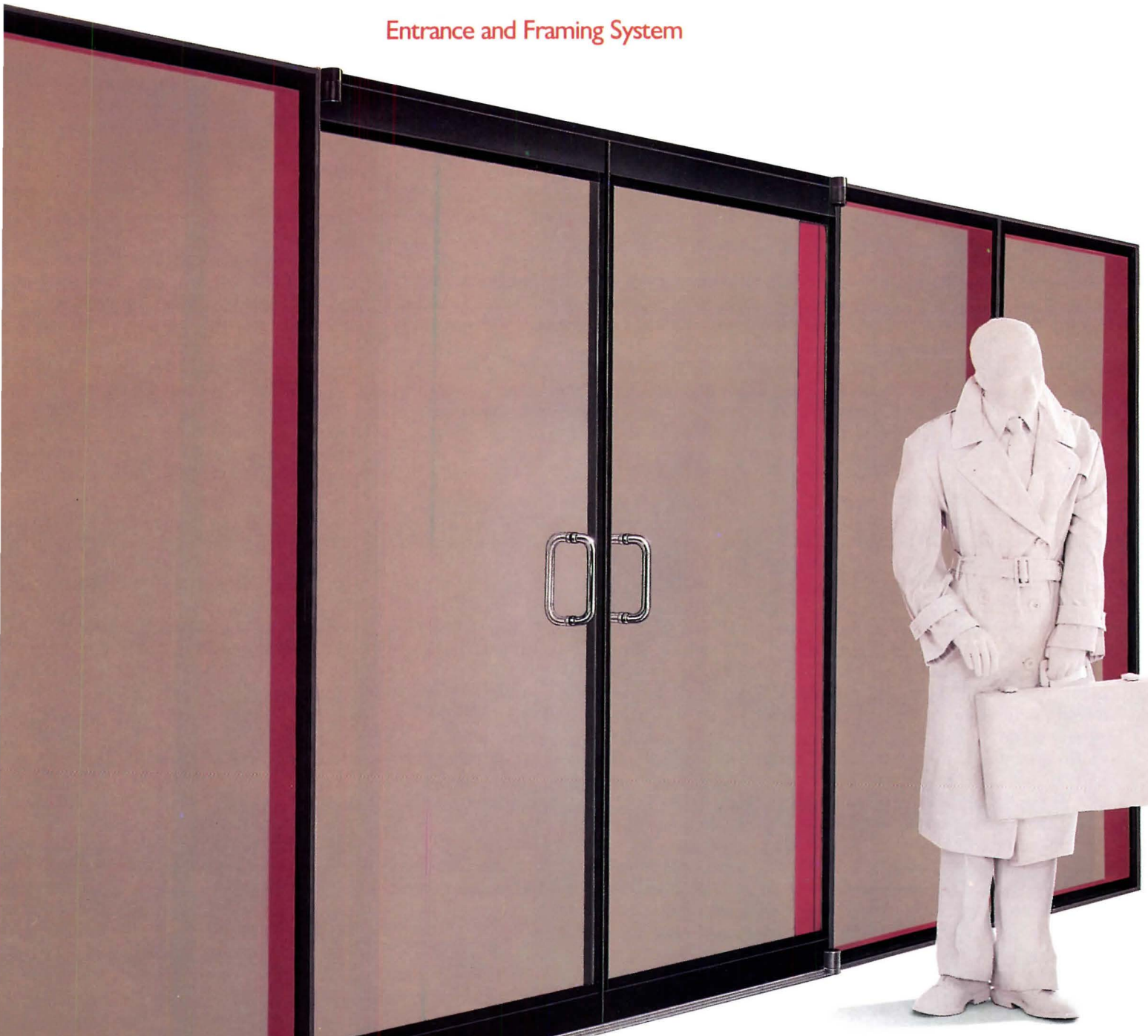
Student Drawings of Madrid's Architecture. An exhibition of drawings of the architecture of Madrid, entitled "Graphic Madrid," was recently on view at the Octagon Museum. Created by students at the Escuela Tecnica Superior de Arquitectura de Madrid, the sophisticated drawings depict buildings and interiors including the Congressional Palace, the National Library and Archaeological Museum, and several churches and street scenes. According to program director Helena Iglesias, some of the buildings were chosen on the basis of social, historical, or representative significance, while others were selected to bring attention to their state of neglect or lack of appreciation. Shown left is a section in watercolor by M.C. Nieto Tortuero of the Church of San Manuel y San Benito.

The exhibition is scheduled to travel to the University of California at Berkeley and to Columbia University. A 96-page, full-color catalog is available for $15 from the Octagon Museum, 1799 New York Ave. N.W., Washington, D.C. 20006.

News continued on page 24

C R Y S T A L I N E

Entrance and Framing System



A glass smooth exterior.
On the outside, new Crystaline from Kawneer presents uninterrupted aesthetic appeal. Four-sided silicone glazing in the door and framing system puts all the glass on the same line for the look of a continuous reflective expanse. Readily available in stock lengths with the design flexibility of 1/4" and 3/8" glazing or the thermal performance of 1" insulating glass. For storefronts, one-story office buildings and even interiors, Crystaline is the total system no matter how you look at it.

Kawneer
The designer's element.

Kawneer Product Information · Kawneer Company, Inc. · Department C
Technology Park-Atlanta · 555 Guthridge Court · Norcross, GA 30092

11 on information card

Housing

Pilot Program in Shreveport, La., Explores Plight of the Homeless

The complexities of housing the homeless came to light in July as architecture students and educators, architects, housing experts, and community activists examined the issue in relation to a building and its community in Shreveport, La.

The event was the pilot project of a larger program called "The Search for Shelter," sponsored by AIA, the American Institute of Architecture Students, and the Neighborhood Reinvestment Corp., an umbrella organization for local nonprofit groups. The Shreveport project included a panel discussion with local and national housing experts, a 35-hour charrette by architecture students and educators from Louisiana Tech University, and a formal presentation of the resultant design/program solutions to the community.

Shreveport, a city of 350,000, is part of a metropolitan region, called ArkLaTex, of 750,000. Shreveport is visibly suffering from the drop in oil prices and the slowdown of American oil production. The city's downtown core has only a few new skyscrapers. Many of the older, low-rise storefronts are boarded up. What was envisioned when times were better as a small, upscale shopping district at the city's terminus at the Red River is now only a handful of shops and restaurants.

The city's housing also shows signs of the hard economic times. Many elaborate houses of the once prosperous are now for sale. And, despite tremendous renovation efforts of local nonprofit and government housing groups (most notably, renovation of shotgun houses in the Ledbetter Heights area), a large portion of the city's poor live in substandard housing. Like most of the rest of the country, Shreveport is not constructing new low-income housing.

What this adds up to is a growing number of homeless and inadequately housed—single men and women, battered women and children, the chronically mentally ill, the elderly.

The workshop's panel considered what is currently being done to house the homeless in Shreveport. In preparation for the workshop, Mayor John Hussey called for Shreveport's first survey of the homeless in its metropolitan area and offered the figure of 1,000. Sister Margaret McCaffrey of the city's Christian Services suggested the number was much higher. "More than 1,600 families are desperate for homes," she said. The city has no group housing for the chronically mentally ill, nor is there enough shelter for battered women, she said. "Each person has a right to a home, to experience his or her own dignity."

Abandoned hotel turned into an SRO.

For the Shreveport workshop and the 20 to 30 similar workshops being planned for late October around the country, the students, educators, and architects are asked to design housing for the homeless—emergency, transitional, or permanent—with input from housing experts and other community members. A goal is to find a building for purchase and renovation or a site for new construction.

The building studied at the Shreveport workshop is the McAdoo Hotel, an 18,200-square-foot, three-story, 1920s brick building that is structurally sound but dilapidated and now vacant. It is located on Texas Avenue, a main artery connecting several neighborhoods with the central business district, and just on the edge of the Ledbetter Heights district. Generally, the population in both areas is at risk, unemployed or underemployed, living below the poverty level in substandard housing, and undereducated.

In the midst of all this is the Oakland/Austin Streets Historic Preservation district, a collection of beautifully restored Victorian houses, now containing small businesses. The McAdoo Hotel shares a street with that small historic district. At the workshop, the district president opposed renovating the McAdoo as a single-room-occupancy hotel, arguing that such a development would hurt the financial viability of the historic district.

Once considered the housing of last resort, single-room-occupancy hotels now are considered viable housing for the homeless or nearly homeless. In fact, some experts consider SROs housing of choice for some, such as the elderly. "The communal nature of this type of housing can be a plus," said Andy Raubeson, director of Los Angeles's SRO Housing Inc. and a workshop panelist.

The specific population for the McAdoo is undetermined, and the charrette participants were asked to consider several different combinations of the chronically mentally ill, the elderly, single men, families, battered women, and children. The architects and students considered choices such as small communal kitchens on each of the three floors or a cafeteria on the first; private bathrooms or shared; and whether to include commercial enterprises on the first floor, such as a self-service laundry or a grocery store.

The student designers removed some partitions in the upper two floors to create common lounge areas. Different groups developed in various ways the atrium/courtyard potential of the first floor. One group raised the second-floor roof to the top floor to open the atrium; another created a day-care playground on the second-floor roof. To comply with historic preservation requirements, the exterior is to be restored with few modifications.

The workshop was sponsored by the Shreveport Chapter/AIA, Shreveport Jaycees, Louisiana Tech University architecture department, Shreveport Housing Authority, Nesbitt Management Co., Landmark Rehabilitation Project Inc., Shreveport Neighborhood Housing Services, and Fairfield Management. Several other civic groups, architecture firms, and businesses also contributed. Building this support coalition may have been one of the most important accomplishments of the workshop.

—Nora Richter Greer

Federal Government Authorizes $1 Billion to Aid Homeless

In late July, President Reagan signed a bill authorizing the federal government to provide more than $1 billion over the next two years to aid the nation's homeless. The first comprehensive action by Congress to address homelessness in this country, the new law authorizes emergency shelter and food, some long-term housing, and services including job training, educational programs, and health care.

Under the new measure, an Interagency Council on the Homeless, composed of the heads of 15 federal agencies, will be established to coordinate the government programs and determine the extent of homelessness in this country.

The new law will provide state and local governments up to $220 million to purchase or renovate buildings for use as shelters. The measure also requires the Department of Housing and Urban Development to identify underused federal buildings that could be converted to facilities for the homeless.

In addition, the law provides $29.5 million for job training and $80 million for health care, and authorizes $35 million for the remainder of this year and an undetermined amount for next year for states to establish emergency assistance for homeless individuals with chronic mental illnesses.—Lynn Nesmith

News continued on page 29

The Institute

Half of Surveyed Firms Have no Liability Insurance

Risky as it seems, one-half of the respondents to a recent survey by AIA of its member firms do not carry liability insurance of any kind.

Typically it is the smaller firms, those with the least amount of income and presumably the least adequate ability to pay claims themselves that "go bare." In the event of litigation, the assets of these firms could be in jeopardy.

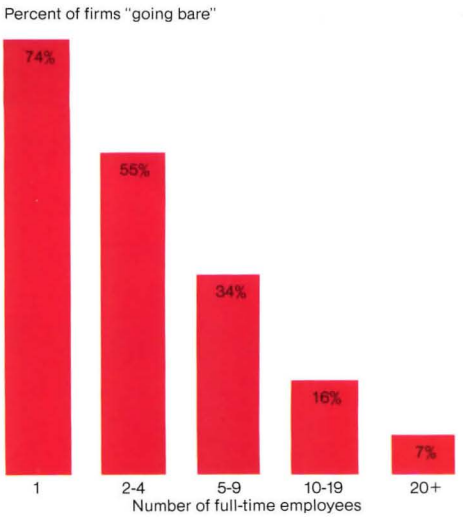
The overwhelming cost of coverage is cited as the reason so many firms risk being sued without an insurance company to fall back on to pay judgments or settlements.

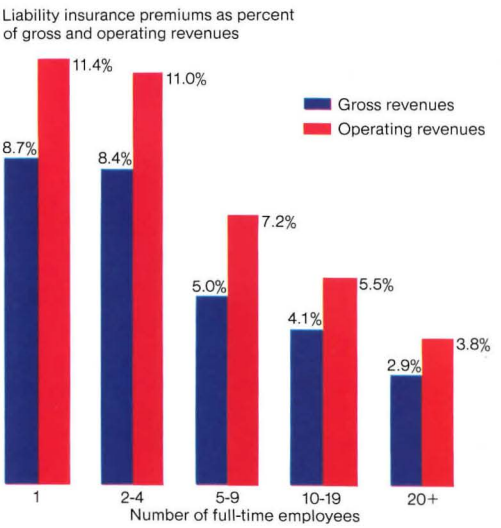
Although the overall average cost is reported as 7 percent of operating revenues, for firms with four or fewer employees the cost can approach 12 percent, a large bite out of a small firm's budget. For larger firms (those with 10 or more employees) the proportion falls dramatically to 5 percent or less.

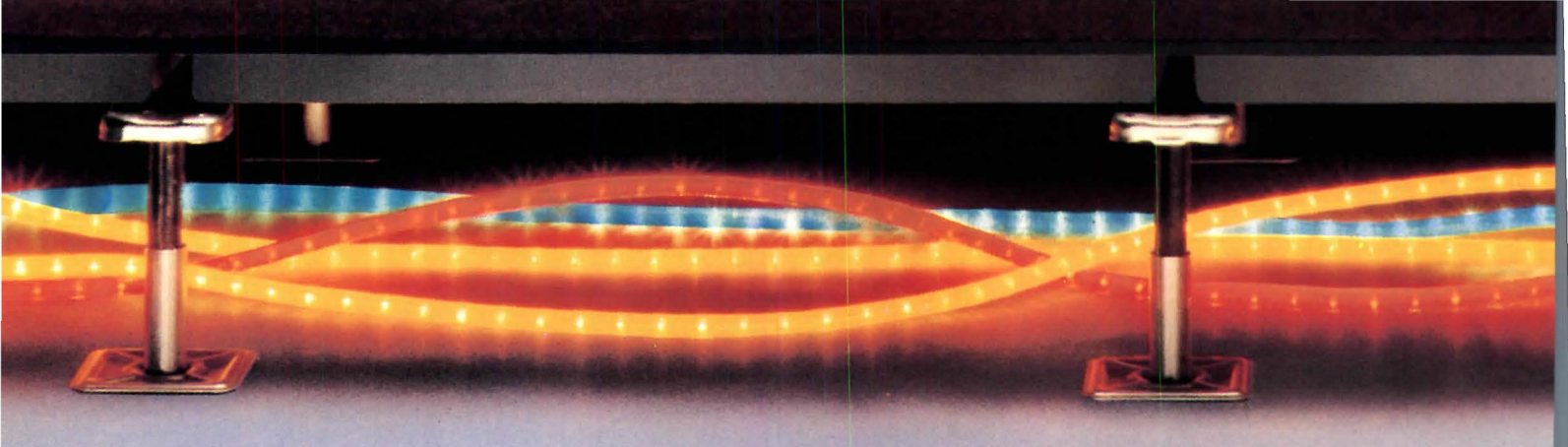
Considering the high cost of insurance, doing without it might not be such a bad business decision after all. AIA found that nearly 90 percent of all firms reported no liability claims against them in 1986. Of the small firms, more than 95 percent said no claims had been filed against them last year. Size apparently predicts which firms are most likely to be sued. The larger the firm, the greater its claims experience. Only 57 percent of large firms reported no claims filed against them. By the very fact that they do more work and thus increase their exposure, large firms can expect to have more claims against them. But another factor could contribute to the greater incidence of claims—these firms are more likely to carry insurance, which in itself can be an attraction to sue.

In an item titled "Going Bare Needn't Be Scary," *Industry Week* reports that the thought of going without insurance has long seemed frightening to many U.S. companies. It can, however, be a viable risk-financing alternative, according to some insurance experts. They say that not carrying liability insurance has the advantages of increasing top management's awareness of claims cost, forcing management to investigate risk transfer alter-

continued on page 33





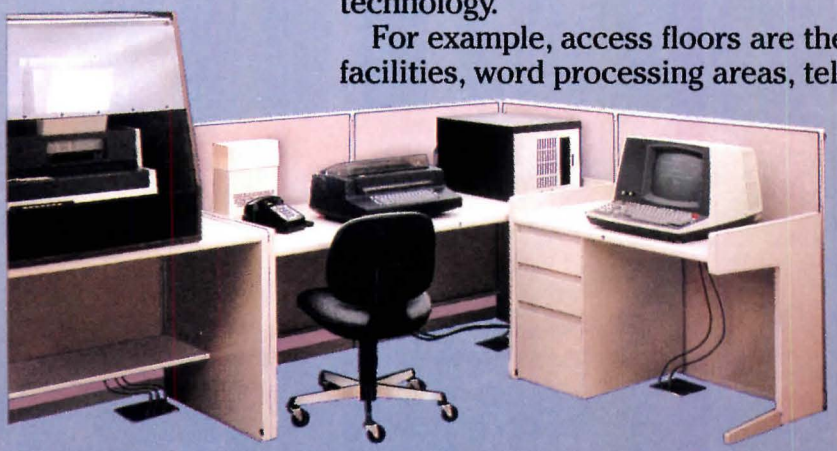


When to buy an access floor.

It's easy to be confused about access floors. Yet, when used in the right applications, they are a superb solution to a complex set of design problems.

Put simply, the more important flexibility is to you, the more you need access floors. Because access floors allow building management a great deal of latitude in adapting an interior space to changes in occupancy, work flow and technology.

For example, access floors are the logical choice for open offices, CRT facilities, word processing areas, telecommunications rooms, laboratories and, of course, computer rooms.



Experience has shown that access floors are highly cost-efficient in office buidings with:

- A 50% + open office plan.
- A 10% or more annual move rate.
- An occupant density of 200 sq. ft. or less per person.
- And technology-oriented workstations with as little as 20% computer terminal density.

In short, the best time to use access floors is whenever the productivity of occupants is most dependent on the network of electronic, communications and computer support systems.

When not to buy an access floor.

There are times when a project is better served using traditional service distribution concepts. But they may be fewer than you'd expect.

While today's average access floor plenum height is only 6″, access floors can add to total building height in some instances.

Also, facilities in which 90% or more of the plan will remain unchanged each year should probably continue to provide services via in-floor trenches.

Cost is a key, obviously, but most people just assume that access floors will be more expensive. In today's marketplace, you may find access floor costs competitive in more installations than you ever imagined.

The Institute *from page 29*
natives and quantify potential costs, and possibly leading to legislative reform of insurance.

The type of project portfolio a firm holds may also determine whether it carries insurance or goes bare. Single-family housing work appears to be relatively risk free. Of the firms that receive three-quarters or more of their revenues from house design (most of which are sole practitioners), only 13 percent carry insurance. However, multifamily housing is a high-risk area. Urban design specialists are less likely than other architects to be insured. On the other hand, firms that concentrate on health care, justice, or industrial building design carry insurance more often than not. Architecture firms working for developers or for private and city organizations are at greater risk of being sued, and thus tend to carry liability insurance.

For a copy of the complete results of the AIA survey of member firms, contact AIA, Research and Planning, 1735 New York Ave. N.W., Washington, D.C. 20006.—Elena Marcheso Moreno

BRIEFS

Public Television Series
"America By Design," a five-part national public television series, will air on successive Monday evenings beginning Sept. 28. Hosted by architectural history professor Spiro Kostof, the series focuses on the events and people that have influenced American architecture and design. The series' five programs will address these factors—"The House," "The Workplace," "The Street," "Public Places and Monuments," and "The Shape of the Land."

Design Competition Winner
Hanno Weber & Associates of Chicago was awarded first prize in a design competition for the town hall complex in the historic district of Leesburg, Va. The winning scheme focuses on a linear town green containing a cylindrical council chamber, which links the town hall with a parking structure. The competition was sponsored by a grant from the National Endowment for the Arts.

Rome Prize Fellowships
The American Academy in Rome has opened the 1988-89 Rome prize fellowship competition in the fields of architecture, landscape architecture, and advanced design arts (architecture, landscape architecture, urban planning, and design arts, including interior, industrial, graphic, fashion, and set design). Deadline is Nov. 15. Fellowships provide winners with a stipend, travel allowance to and from Rome, housing, most meals, and a studio/study space at the academy's facility in Rome. No courses are offered; winners pursue independent study. Applications are available from the Fellowships Coordinator, American Academy in Rome, 41 E. 65th St., New York, N.Y. 10020, or by calling (212) 517-4200.

Wood Design Competition
The American Wood Council is seeking entries for their nonresidential wood design competition. Projects must incorporate structural and finish applications of wood and have a dominant wood appearance; both new and remodeled nonresidential projects are eligible. The deadline for entries is Oct. 1. For more information, contact Tina Laver, AWC, 1250 Connecticut Ave. N.W., Washington, D.C. 20036.

Craftsmanship Awards Program
Kraus Sikes Inc. is sponsoring The Guild American crafts awards program for the best in new design and fine craftsmanship in residential furnishings. Prizes of $1,000 will be awarded in five categories: textiles and fabrics; freestanding furniture; decorative work; functional objects; and installed architectural details. The deadline for entry is Sept. 30. For more information, contact John Venekamp, Kraus Sikes Inc., 150 W. 25th St., New York, N.Y. 10001.

Student Competition Winners
The Association of Collegiate Schools of Architecture announced the winners of the fifth annual ACSA/American Wood Council student design competition. The program cited winners in two categories. The students honored for proposals for a wood design institute were: Eric Kellogg Beach of Rice University (first place);

continued on page 37

Only one other face can be linked to a team as good as ours.

Vince Lombardi was more than a football coach. He was a living legend. An inspiration to all those who played for him. And against him.

We have the same drive that made Lombardi the very best.

It can be felt through Team Alucobond, a nationwide group of distributors and employees. Dedicated professionals who know their product and know how to get your materials on site. On time.

What's more, you can be sure our distributors will keep the installation of your materials on schedule. And at a price that's less than you'd expect to pay.

Our same drive for excellence can be seen in the products we create. Such as Alucobond® material, the innovative building face that's changing the face of modern commercial architecture.

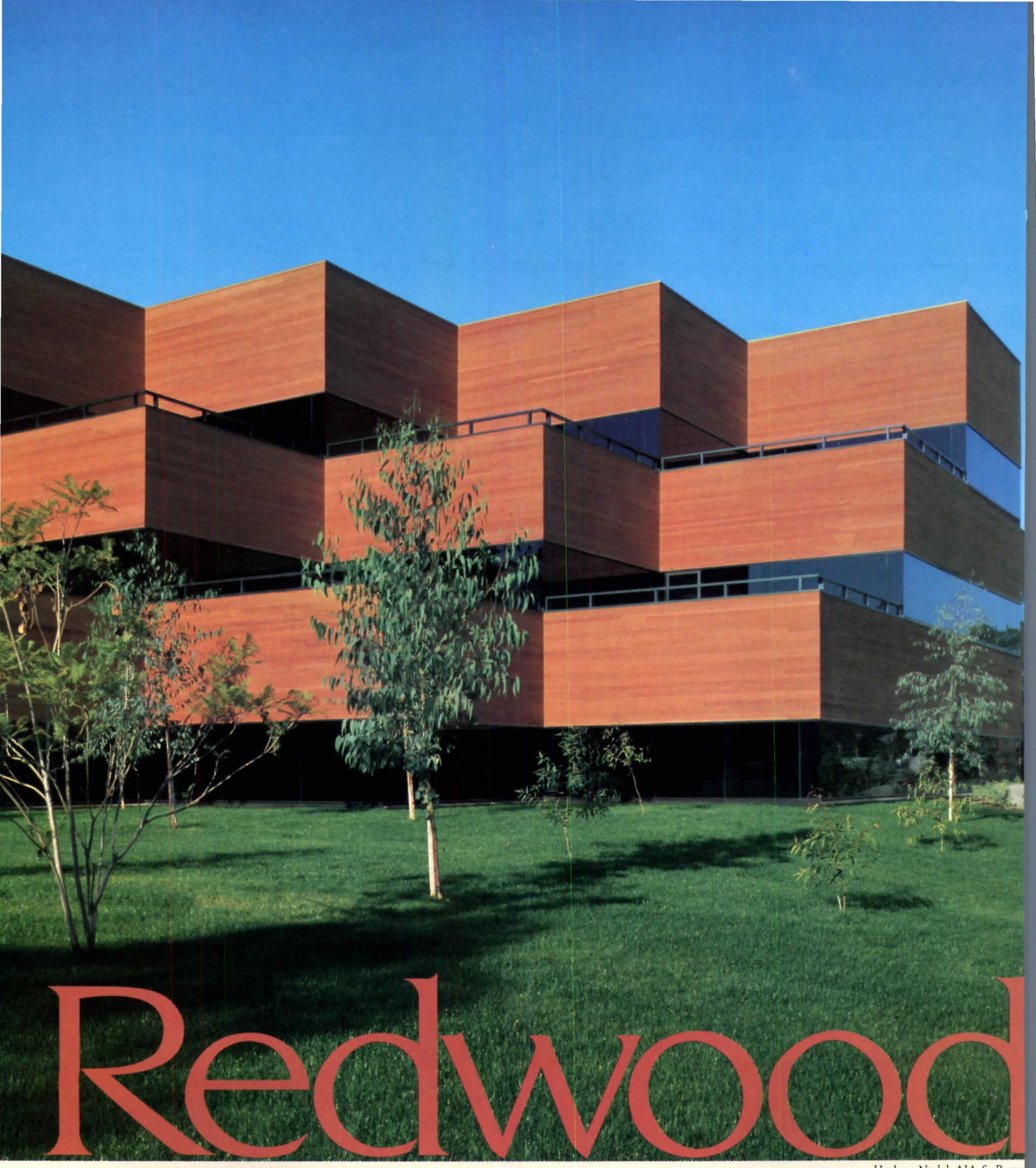
Made with two tough sheets of aluminum with a thermoplastic core, Alucobond material is

Briefs *from page 33*
Harry A. Mark of the University of Texas at Austin (second place); Ame M. Engelhart of the University of Cincinnati (third place); and David P. Ramstad of North Dakota State University and Michael Philip Rose of Rice University (honorable mentions). Winners in the open category were: Jeffrey Allen King of Tulane University (first place); Rosemarie O'Grady of Cornell University (second place); Gibson Midgley Jones, also of Tulane (third place).

Loeb Fellows Awards
Twelve architects, planners, and design professionals have been awarded Loeb Fellowships by Harvard University Graduate School of Design for the 1987-88 academic year. They are: Rebecca Barnes, urban designer and project manager, Seattle Department of Community Development; Linda Bassett, executive producer/director, WEDU-TV, a public broadcasting affiliate, Tampa, Fla.; Laurie Beckelman, executive director, New York Landmarks Conservancy, New York City; Ann Beha, principal, Ann Beha Associates, architecture, planning, and historic preservation, Boston; Philip Borrero, assistant executive director, Suffolk County Human Rights Commission of Long Island, N.Y.; Jeffrey Froke, ecologist, land manager, and administrator of the National Audubon Society's nationwide sanctuary system, Santa Margarita, Calif.; William Geary, chief executive officer, Boston Metropolitan District Commission; Edith Netter, land use attorney in her firm, Edith M. Netter & Associates, and counsel to the Boston law firm of Warner & Stockpole; Bradford Paul, executive director, North of Market Planning Coalition, San Francisco; Luiz Santana, principal and head of design for the Slaney Santana Group, Dallas; Patrick Too, principal urban designer, City of New York Department of City Planning; and Fei Tsen, president, Tsen and Associates, San Francisco.

Architectural Design Awards
Architectural Design magazine is sponsoring an international design award competition open to architects and architecture students, for executed or unrealized projects not more than two years old. The deadline for submissions is Oct. 31. For more information, contact John Melvin, Architectural Design Awards, 42 Leinster Gardens, London W2 3AN England.

Architectural Practice Handbook
The Architect's Handbook of Professional Practice is now available from the AIA bookstore. The handbook has been completely revised to include information on the role of architects in society, firm management, and the use of AIA documents. For more information, contact the AIA bookstore, (202) 626-7474. □



Herbert Nadel, AIA & Partn

Natural beauty, durability and stability make it the natural choice for creative designs that endure. Send for Redwood Architectural Guide.

CALIFORNIA REDWOOD ASSOCIATION 591 Redwood Highway • Mill Valley CA 94941 • (415) 381-13(
GEORGIA-PACIFIC CORPORATION • MILLER REDWOOD COMPANY • THE PACIFIC LUMBER COMPANY • SIMPSON TIMBER COMPA

Circle 23 on information ca

ARCHITECTURE

The new buildings from abroad shown in this issue speak not of trends but of a search for quality, appropriate expression, and verve. The majority incorporate most of today's design tendencies and, importantly, benefit from expanding their boundaries.

Most of the buildings show an appreciation of currently popular regionalism, but each is a translation of local characteristics into a contemporary tongue enriched by current idioms and inflections. Similarly, almost all respect history and context but without becoming sentimentalized copies of old images. Absent is a prevalent fear and rejection of change. Virtually all the buildings are a repudiation of the banal, fantasy images of postmodernism, but also of modernism's conviction that our obviously messy, confusing world is actually perfectible. The architects represented here show a willingness to work with mess and confusion. Most have cast a fresh eye on modernism, often in an attempt at enrichment—which was, of course, what postmodernism originally hoped to do for modern architecture. As Norwegian architect Blå Strek says, "We have been influenced by present tendencies where many things are allowed to happen at the same time." This is an attitude that has allowed him and others whose work appears here to forge a spirited architecture of imagination.

—Andrea Oppenheimer Dean

(Ms. Dean has been editor in charge of the review of world architecture since its inception. D.C.)

Japan

Two Ando Buildings Are 'Calm and Quiet' But Differ in Mood

During a visit to Japan last summer, I was curious to see how Tadao Ando's work had evolved. Four years earlier, I had been impressed by the presence and dignity of several of his houses and shopping complexes in the Mount Rokko-Kobe area, as conveyed by a concentration of themes, simple geometries, and a limited palette of materials. The two new buildings I saw a year ago—Mount Rokko chapel and Mon Petit Chou pastry shop and cafe—reflect a maturing of the same concerns, plus a desire to extend them into both sacred and profane realms.

The two buildings offer a compelling contrast. Mount Rokko chapel's primary purpose is Christian wedding ceremonies, and it is attached to a resort hotel on a spectacular site overlooking Kobe Bay. Mon Petit Chou, on the other hand, is a place for amusement and relaxation in a fashionable area of Kyoto.

But primary geometric forms govern the composition of both projects. The chapel is composed of a long, low, vaulted passageway, a double-cube sanctuary, and a rectangular bell tower; the coffee shop is contained in a low, vaulted rectangular volume intersected by a curved wall enclosing a seating area. Both have concrete walls, carefully modulated proportions, and vaults that are legible in their pure form and cover single volumes.

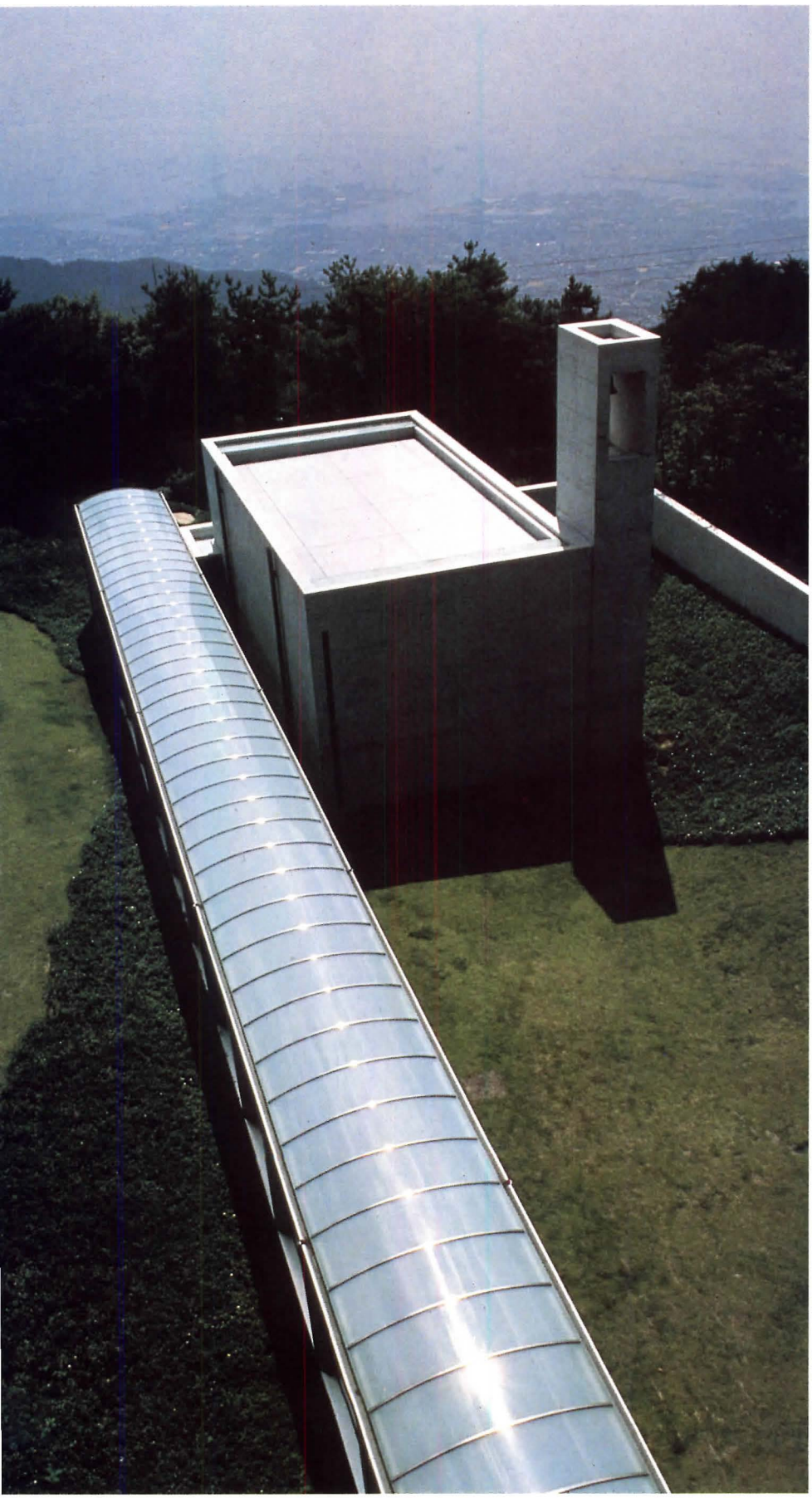
The manipulation of light on concrete surfaces is achieved in both buildings through slots in the horizontal roof plane close to the wall edge that illuminate the front and back wall of the chapel and Petit Chou's curved wall. Also common to both is controlled use of landscape: the chapel and seating area of the cafe both have major glass openings facing an inclined "green plane" that rises upward and out from the floor to a concrete garden wall to complete the enclosure.

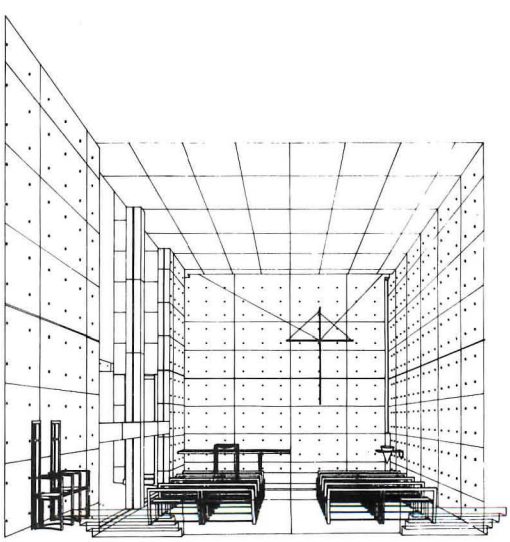
In both buildings, a light steel tracery of furnishings, light fixtures, and ceremonial objects contrasts with concrete walls. Materials are monochromatic—gray concrete and stone flooring, black steel and window framing—accented only by wood flooring and greenery.

Finally, the buildings share a sense of removal from their site: both are partially buried and enjoy a profound calm and quiet despite their insistent surroundings.

The differences between Mount Rokko chapel and Mon Petit Chou are in mood and emphasis. In the chapel the choreography of procession is highly developed. From the hotel garden you arrive at a small, semicircular terrace to see the passageway, chapel, and bell tower in the grassy landscape. The long, narrow passageway with translucent wall panels, natural light playing across solid walls from slots, and a vaulted skylight draws you toward a framed view of trees and the bay far beyond. Just before the end, a curved vestibule creates a U-turn and leads you into the back of the chapel facing the altar. The movement from luminous passage through dark vestibule to bright chapel has a dramatic intensity paralleling the ritual performed within.

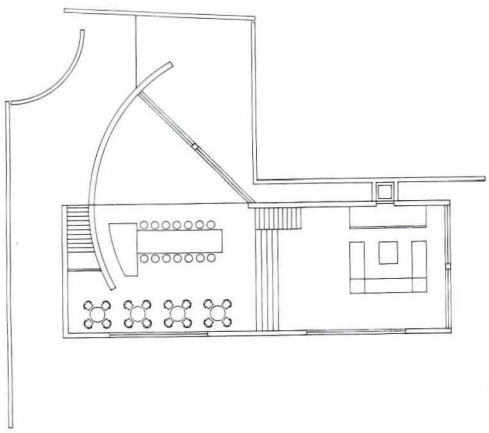
On the other hand, movement into and through the cafe is more relaxed and informal, with entry on the more solid side wall rather than on the glazed street side as you would expect. Inside the cafe, the volume is divided in two—the front half at street level is the pastry shop and the rear is a raised platform for seating. Between the two rise wide steps. A narrow flight almost incidentally leads to the garden level below, which contains the two-story cafe enclosed by an arc open to the inclined garden. The space and its





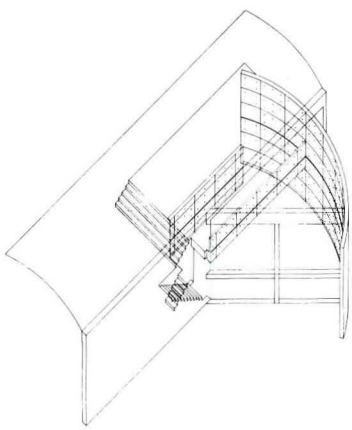
Facing page and left, chapel consists simply of a passageway, sanctuary, and bell tower. Top, passage with translucent walls. In photo and drawing above, double cube sanctuary with light steel tracery of furnishings.

Below, Mon Petit Chou's profile is a vaulted rectangle. Below left, entrance is on a side street. Drawings and photo, below right, show curved volume that wraps seating. Bottom and facing page, lower cafe opens to an inclined garden.



Y. Shiratori

Y. Shiratori



movement are playful and surprising.

Perhaps the most striking difference between the Mount Rokko chapel and Mon Petit Chou is in composition. While the same basic geometries are employed in both, the chapel is an assemblage of discrete parts echoing each other, while Petit Chou is a single, vaulted rectangle with an outward displacement of one of its parts. Inside, a side wall swings like a hinged kitchen door to capture a dynamic space within the static volume.

These two recent works indicate an enrichment of Tadao Ando's carefully selected palette. Ando is working with strategies of composition more diverse than his earlier bipartite schemes. These include a combination of unequal elements at the chapel; the dymanic use of the curved element at the cafe; a departure from the completely internal orientation of earlier projects; and the addition of luminous spaces, such as the chapel passageway, to the familiar vocabulary of darker, solid-walled interiors with shafts of illumination.—ANDREA P. LEERS, AIA

Ms. Leers is a principal of Leers, Weinzapel Associates Architects Inc. She is on the design faculty at the Yale school of architecture and has received several grants for research in Japan.

Japan

A Museum Turns A 'Reflection House' Inside Out

In the 1970s, Hiroshi Hara created "reflection houses," which, like so many other works by young Japanese architects during that decade, were almost entirely closed to the exterior environment. On the outside the houses were deceptively simple boxes, usually painted black as if further to efface their presence. Stepping inside, one was transported to a startlingly different world. The top-lit central corridor, with walls painted white, expanded and contracted as if in peristalsis, or it led down through what seemed like a frozen cascade. The space was suffused with light that blurred edges and lent a dreamy quality to one's experience.

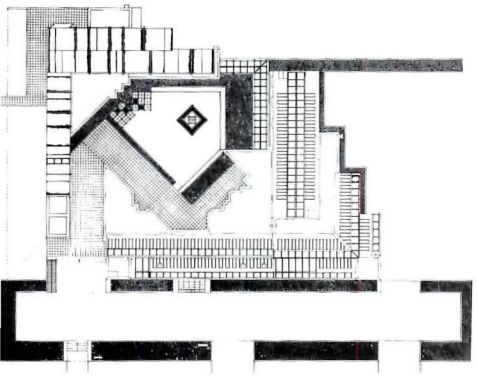
Critics at the time faulted young Japanese architects like Hara for being overly introspective and escapist, and without a doubt an air of unreality pervades the interiors of the reflection houses. Since around the time of the Nakatsuka house (see Aug. '83, page 150) Hara has gradually opened up his buildings, but not in the way critics envisioned. The opening up has not introduced a touch of cold reality to his interiors but has had quite the opposite effect; the dreamlike quality hitherto bottled inside the houses has been allowed to escape and to bring into question the reality of the exterior environment. In the Tasaki Museum of Art, Hara in fact has managed to turn a reflection house inside out.

A word that Hara uses quite often nowadays is *modality.* The 21st century, he asserts, will be an age of ambiguous and amorphous modality. The arts and sciences today are already increasingly concerned with soft-edged phenomena. Architecture should be in tune with the spirit of the times and aspire to the level of indeterminacy of, say, clouds, mists, and rainbows, or the shifting, ephemeral quality of human consciousness.

Karuizawa is a summer resort area in the highlands of Nagano Prefecture, about two hours by train from Tokyo. Here Hara has designed a small museum dedicated to the work of an artist, Hirosuke Tasaki, who lived and worked in the area, painting landscapes in general and mountains in particular.

The museum is set in the woods and divided into two buildings that enclose a courtyard. One building houses the exhibition and storage spaces, a coffee shop, and service areas; the other accommodates an office and a smaller exhibition space devoted mainly to biographical material on the artist. The exhibit spaces are lit from above and defined by rectilinear walls. They are cool and calm, and the slender columns, standing at eight-foot intervals, create the effect of a quiet glade. The areas facing the courtyard are, in contrast, disorienting. The multifaceted glass screen zigs and zags, and reflections of the interior overlap views of the courtyard. Abstract patterns and figures of birds etched here and there on the panes of glass make an accurate reading of space all the more difficult. The distinction between inside and outside is further blurred by roof forms: a cloudlike roof in exposed concrete *inside* the larger of the two buildings is repeated, clad in steel, on the *outside* of the smaller (above

The forest of columns inside the museum mimics the grove of larches in which the buildings stand, and the steel-



clad clouds echo the cumulus overhead (right). An interplay of nature and architecture is complex and fascinating. Hara's interest in this theme may be traced to his childhood in a mountainous area, not very distant from Karuizawa. The architect has often said that the way he looks at the environment and the way he designs probably have been colored by the environment in which he grew up.

In winter this is one of the coldest areas in Japan, and the museum is open only six months of the year. When it is closed, the paintings are stored in a room inside the exhibition space. Temperature inside the rest of the building is allowed to drop to prevent condensation. For the steel-clad, cloud-shaped roof forms, heaters activated by sensors have been installed at the points where the forms dip down to gutters, to prevent ice from building up and damaging the roof through expansion.

Hara recently completed an office building and warehouse for a company in Tokyo, his biggest commission to date, and now is designing another museum in Nagano. After many years spent almost exclusively on residential design, he appears prepared to tackle buildings with very different functions and in very different situations. In the Tasaki Museum of Art and the Josei Primary School, which follows, he has demonstrated an ability to create highly original solutions that are at the same time responsive to their environments.—HIROSHI WATANABE

Mr. Watanabe is an architect in Tokyo. He has been a correspondent for Architecture Plus *and is a frequent contributor to* ARCHITECTURE.

Japan

Elementary School Like a Cluster of Traditional Houses

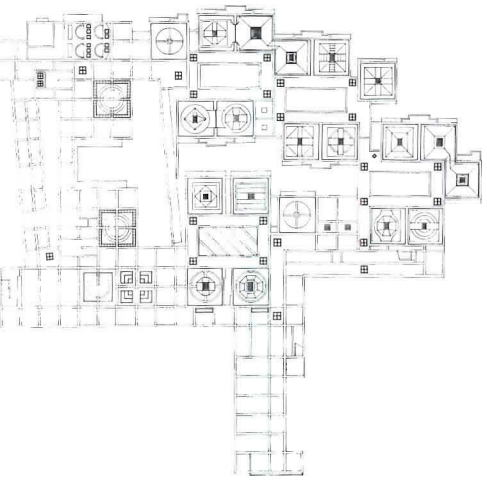
Hiroshi Hara, who also teaches at the University of Tokyo, was asked to design new facilities for the Josei public elementary school just down the hill from Shureimon, a castle gate that is the symbol of Okinawa. His idea, inspired by an old photograph, was to model the school outwardly on a cluster of traditional Okinawan houses, much like the ones that, according to the photo, used to stand outside the castle gate.

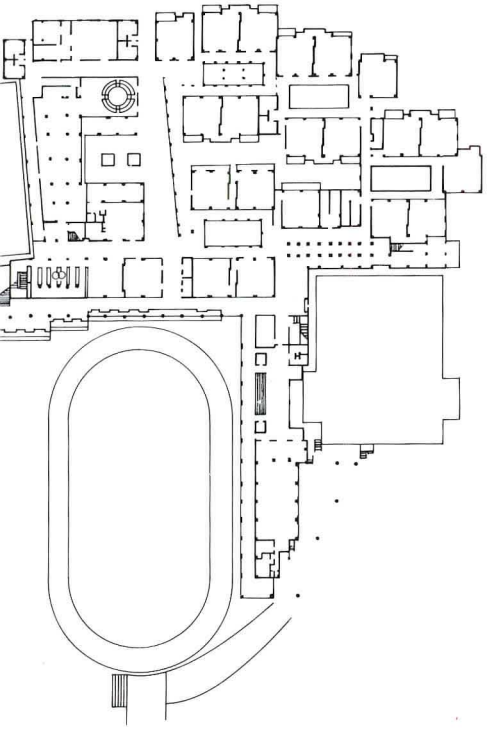
Hara has been interested in traditional villages for many years and, with members of his university atelier, has conducted field surveys of communities in East Asia, the Near East, Africa, and South America. What direct influence such studies have had on his own design work it would be difficult to say, yet the two activities have had a common objective: the discovery of alternatives to the modernist approach to architecture. Hara's goal is to find ways to create *domains* instead of homogeneous, universal spaces.

The new school, which was built in three stages, gradually replaced existing buildings, of which only the gymnasium and a three-story building for special classrooms were retained. To create the effect of a village, the new buildings had to be kept low, particularly in the area closest to the castle gate. A facade in keeping with the new buildings was added to camouflage the three-story building.

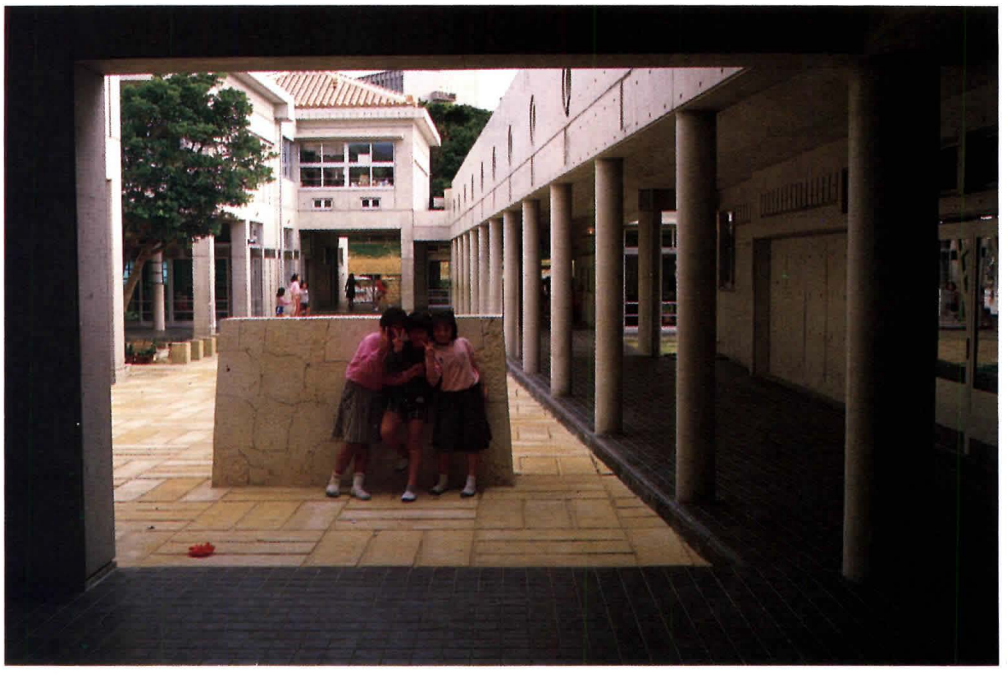
There are five classrooms for each grade, and these are clustered around either a courtyard or a roofed work space. The classrooms are completely open to the central space so that students and teachers can immediately see what is

Fukumura





Fukumura



Fukumura

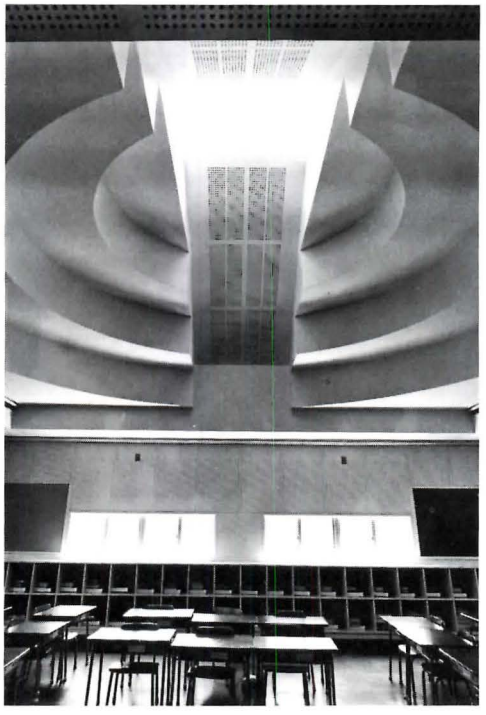
Left, the cellular plan is based on traditional clustered Okinawan villages; bottom, perched rooftop lion. Top right, roofs are tile laid on concrete slabs; right, one of several courtyards.

taking place in other areas of a cluster. This openness is not merely the sign of a progressive approach to education; it promotes natural ventilation, which is essential in this subtropical climate.

The structure is of reinforced concrete. Tiles common to Okinawa have been laid on concrete roof slabs. These tiles, which are trimmed with white plaster to keep them in place even in typhoon weather, are a light reddish brown that darkens as a mold develops. *Shiisaa,* traditional lion figures meant to ward off evil, are perched here and there on the roof.

At one point during the design, the architect and the client nearly gave up on the idea of using the traditional tiles because of the cost—despite its unconventional design, the school had only the usual building budget—but people at the school and local residents began a campaign to raise the required amount, with each contributor chipping in the cost of one tile. A national newspaper publicized the campaign, and money came in from distant areas of Japan.

Inside, the most impressive features are the classroom ceilings. Each is lit by a central skylight and peripheral fluo-



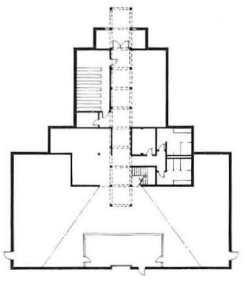
Top, three different skylit ceiling configurations; above left, a so-called 'work space' surrounded by classrooms; above right, staff room.

rescent lighting, but otherwise the ceiling forms all vary. Built of plasterboard and, where curved, of plywood, these imaginative ceilings are themselves a lesson in geometry. The day the students moved in, they wandered, fascinated, from room to room, and apparently not much schoolwork got done.

The children, it appears, have completely taken over the school. Whiffle balls are batted down corridors at recess, and the many corners offer opportunities for momentary escape from a teacher's eyes. If discipline seems relaxed, there is also a liveliness that is communicated the moment one enters the building. Never, one feels, has being at school meant so much fun.

The population of the school district had been shrinking, and authorities predicted a day when each grade would require only four classrooms. One classroom out of each set of five was meant eventually to be turned over to special uses. However, since its opening the school has proved so attractive that parents of school-age children have been moving into the area, blunting the decline in population and necessitating the continued use of all classrooms. This contextualist solution for a former kingdom by the sea appears in every way to be a success.—HIROSHI WATANABE

Canada



Mining Museum Takes Its Form From Its Industry

Minerals, including iron, zinc, and silica, are economic mainstays of the Maritime Provinces. As a result, head frames, the enclosed vertical housings for elevator pulleys over mine shafts, are a common feature on the landscape. This little building—a mining and mineral "interpretation center" intended to help draw tourists to the northern reaches of New Brunswick—is appropriately designed to echo the forms of head frames. The architects are Fowler Bauld & Mitchell of Halifax, Nova Scotia, associated with Jacques Boucher of Bathurst, New Brunswick.

Located in the village of Petit Rocher (population 1,750) on the Bay of Chaleur, the 7,680-square-foot interpretation center occupies the inland end of a deep, barren, coastal site. Between building and bay are displayed rail cars and other large artifacts used in mining.

The center's light gray vertical metal siding reflects an industrial esthetic, and black asphalt shingles set off by deep red aluminum fascia and window frames imply a less utilitarian purpose. Broad roof forms and berming along the sides make the base of the building seem low and firmly rooted, while the front telescopes out and slightly down to meet visitors in a friendly way.

You enter under a red steel frame representing pit props and shoring that projects from a cast-in-place concrete portal (like a mine entrance) and continues straight back into the center of the building. Interior finishes are minimal. Exposed metal framing and roof decking, drywall partitions, and industrial carpet are background for mineral displays; lights, mostly incandescent, are on suspended tracks. Two flights take you inside the frame head tower offering panoramic views of the surrounding land and bay.

—Allen Freeman

Canada

High-Tech Structure Looks More Complicated Than It Is

Geology is no longer associated with mule-mounted, pick-and-sluice-pan-equipped sourdoughs* prospecting for precious metals. It is now a sophisticated science that studies moon rocks.

The University of Manitoba in Winnipeg wanted a building to honor this transformation. The earth sciences building by IKOY is elevated on a modest plinth of "tyndel," a local stone, to celebrate its sourdough origins, politely acknowledge its neighbors, and appease campus traditionalists. The rest of the building is dark gray anodized aluminum and glass.

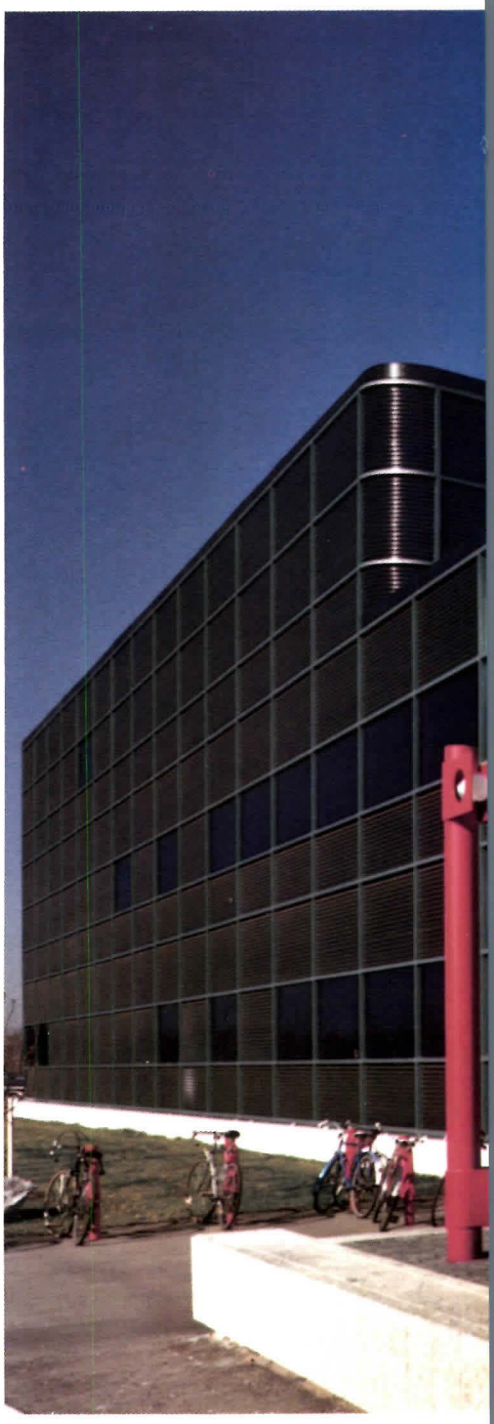
The site is on the river side of a ring road that was planned for service with bordering parking lots and agricultural barns, but is now the primary entrance to the campus. The earth sciences building is a monumental campus gateway.

The students have dubbed the building "Darth Vader." According to the building's designer, they hold technology in veneration but are afraid of its dark side. To them, Einstein is Darth Vader. Although this kindly man did not make the atom bomb, he is blamed for it.

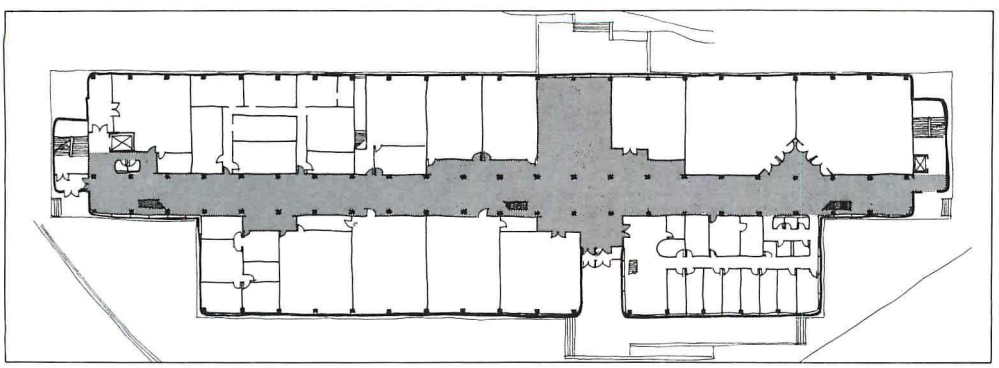
Ironically, the earth sciences building is no more high technology than Einstein is Darth Vader. It is a classic trabeated system with a frieze of hollow-core concrete planks. The ordered row of columns substitutes haunches for column capitals. It is a visually direct system consciously avoiding the mystical. The effort is not to simplify a complex technology but to amplify a simple one. Beam to column is the key, and the building is classical in the sense of base column beam defining the loads the structure supports.

Unlike other campus buildings that are connected by underground tunnels, the

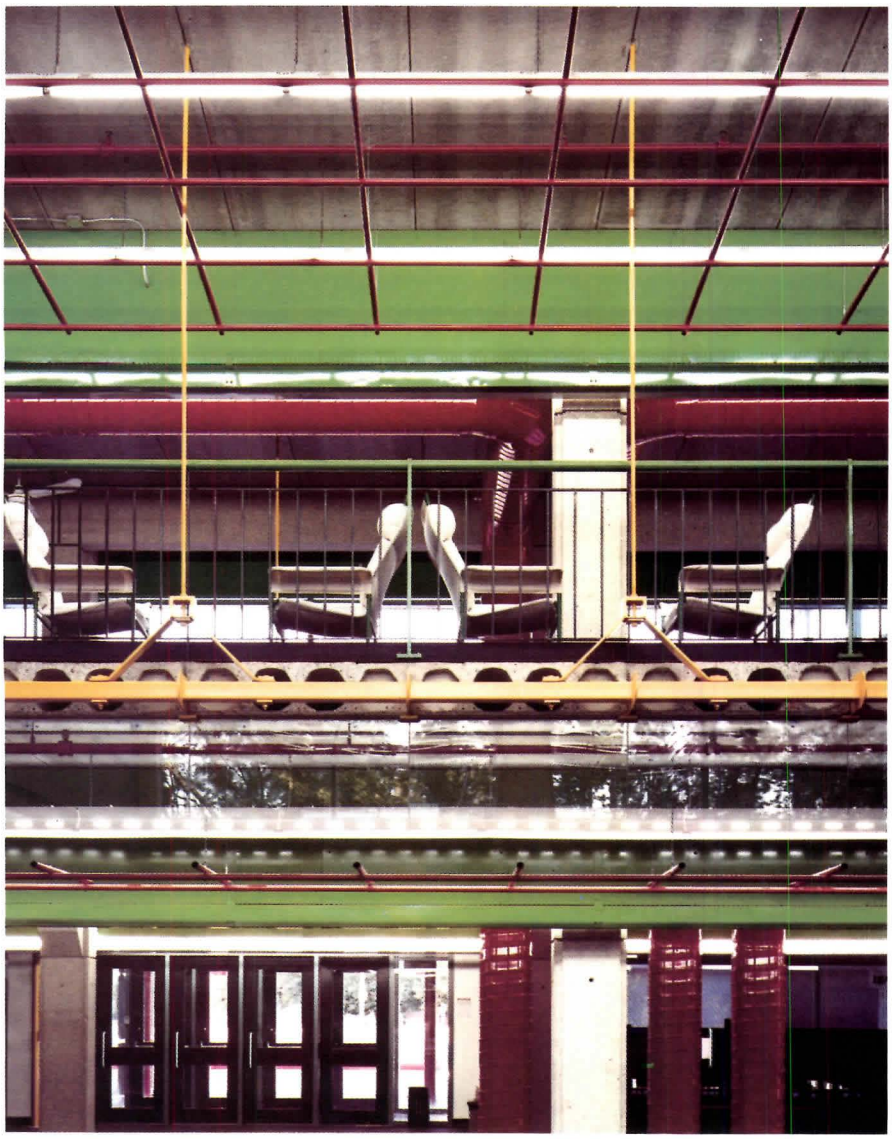
**sourdough—a veteran inhabitant, especially an old-time prospector, of Alaska or northwestern Canada*



Photographs by Gerry Kopelow



Left, bundled laboratory exhausts. Above, main entrance to offices and laboratories. Right, approach to the building from the ring road. Major student parking area is to the right of the building.



earth sciences building has as connector a three-story, multilevel galleria passing through and up and down the building. The galleria is the living room of the building, a place to hang out, lean on the rails, and watch fellow combatants in the war against ignorance pass from battleground to battleground.

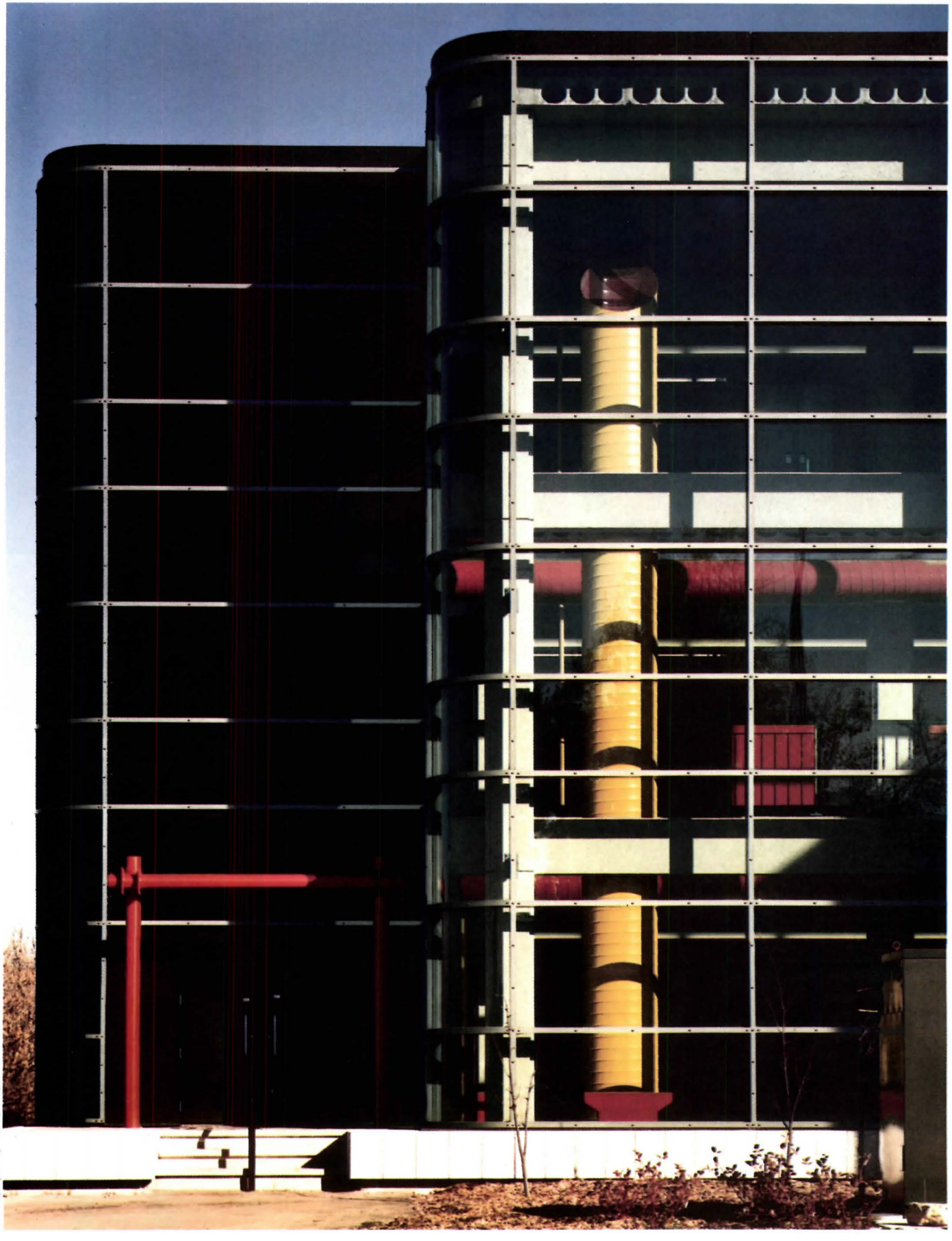
Bursts of natural light enter at the galleria's ends and two central points. Boxes for switch gears, make-up air, and return air are furniture events along the promenade. Classrooms and labs—simple working spaces—open off the galleria.

All classroom and laboratory furniture is made from industrial warehouse furniture systems. The parts, all by four or five manufacturers, are easily and dependably replaced. The university maintenance workers cut, repair, and modify equipment without the need of cabinet makers and their sawdust.

All products used in the design of the earth sciences building are generic—that is, available from a number of manufacturers in the region. The building cannot be made obsolete by the inability to replace part of a product line.

The idea here is comfort in knowing, answering some of the "whys" of the world, in this instance why buildings stand up. It is a reassuring building. It can be trusted even though the high technology of Darth Vader is suspect. Geology has in the past been the comfortable, old-shoe science of rock hounds. Apparently it is no longer, but, if the building is comprehensible, then perhaps the earth sciences can be understood.—Forrest Wilson

Above left, seating area overlooking the galleria. Left, stairs to galleria second level. Right, entrance to galleria from a large student parking lot.



Photographs by Gerry Kopelow

Spain

Emotive Spaces, Rich Colors in a Picasso Museum

Carrer Montcada, a long, narrow street lined with palaces dating as far back as the 13th century, has come out of oblivion to be one of Barcelona's most compelling cultural attractions. Over the last few years it has become home for a number of museums and galleries; the best known private gallery is the Maeght, while the most famous small public installation is the Picasso Museum, dedicated to the artist's early work.

Less than 100 meters from the city's most treasured Gothic church, Santa Maria del Mar, the Picasso Museum occupies three palatial mansions. To date, proposed rehabilitation and expansion of only one palace, the Meca, is complete.

Barcelona architects Jordi Garcés and Enric Sòria started conceptual work for the three palaces in the early 1980s, while the city went about acquiring the first of the three to enlarge the existing facility. Because the building was in very bad shape and the administration was willing, the architects were able to intervene in a fairly dramatic fashion.

Their attitude toward restoration is summarized by fellow Barcelona architect Oriol Bohigas. "The architects chose to respect the structural qualities resulting from multiple historical layers on which they superposed yet another to create a functional museum and reinforce the public character of the palatial sequence on Carrer Montcada." In all their work, Garcés's and Sòria's approach is always bold, never nostalgic. They keep what deserves to be kept but have no qualms about eliminating secondary, cluttering elements. Their lines are stark, materials sober; their forms are inspired by the modern tradition.

Their strategy for the museum was to create a new visual order through a long, connecting corridor cutting across the three palaces. The corridor consists of a succession of spaces whose walls and proportions are adapted to displaying art. It divides the ground floor into two distinct areas.

On the street side, the architects left untouched the three original patios, characteristic of Barcelona's palaces; two of these have a magnificent exterior stair to the upper floor. Access from the street to the patios is from each of three porte-cocheres. These have elegant metal gates made of painted iron and brass elements woven in a diagonal mesh, which evokes the patios' paving pattern. To accentuate the public nature of their project, Garcés and Sòria left intact the paving of the patios as well as the larger stone paving in the connecting corridor.

Ancillary services are in rooms opening to the corridor. In rooms fronting the patios, believed to be the former stables, are a bookstore, cafeteria, seminar rooms, and public washrooms. (The men's is particularly beautiful with its long passageway between two high, facing walls, one left with its original stone cladding, the other covered with glistening white tile.)

All enclosed spaces have gray and white marble floors, designed so that the lighter-colored areas serve as reflectors for surrounding light sources. Wherever possible, the architects retrieved maximum natural light through back walls. The impression, as one walks down the corridor, is of subtle patches of light, natural and artificial, pulling the visitor gently

Left, Carrer Montcada in front of the Picasso Museum in Barcelona. Below, patio with side stair. Right, view of the entire length of the central corridor.

Left, museum library with openings in back to bring in natural light. Right, marble service stair off central corridor.

along to the end walls, each of which serves as backdrop for a solid marble bench.

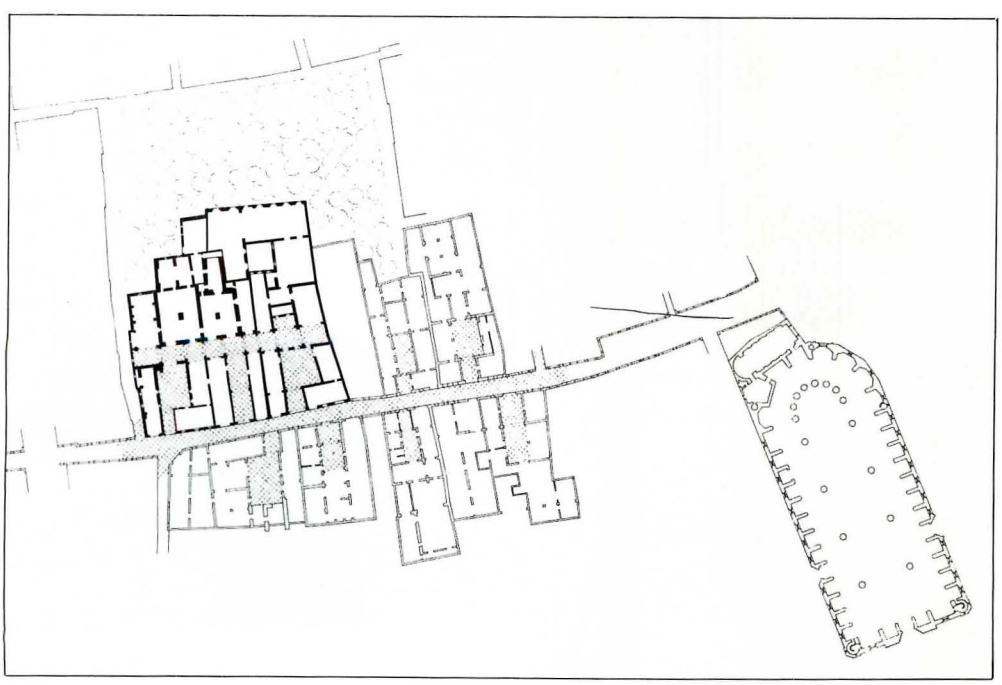
The openings are probably the most striking new architectural element of the project. Like the metal gates, they are painted iron and brass, molded into box-like frames over arched windows and doors. This allows for sufficient overlap on all sides so that full perception of the stone details is possible through the large glass panes. Openings in party walls marking the passage of one building to the next are squared off and treated very differently from the original stone archways. There is no attempt to camouflage the new.

The only frivolous note, other than the marble floor design, is the use of color, here and there. All walls that had to be stuccoed were painted "Picasso blue" as a reminder of the artist's early period.

Overall, and despite its modest size, the Picasso Museum is one of the most striking works recently completed in Barcelona. In part, this is because Garcés and Sòria pay attention to issues of urban planning, a field thankfully still part of the architectural domain in Spain.

—Odile Hénault

Ms. Hénault, a Canadian architect and former editor of Section a, *now lives in Spain.*



Photographs by Miguel Castañeda

Denmark

Cooperative Housing Makes Wider Use Of Shared Facilities

In Denmark as in the United States, the '60s saw the beginning of alternative habitation with its emphasis on integration and sharing. Young people moved in together in large old villas and farmhouses. They shared their lives and hopes, cooked and cleaned and studied together, built devices to harness ambient energy, and transferred their ecological concerns into producing their own vegetables and meat without chemical fertilizers or toxic "growth" medicine.

But whereas in the United States the communes all but disappeared with other aspects of the counterculture as time went on, in Denmark the concept of communal living and shared facilities has become an intrinsic part of the national housing effort.

Danish public cooperative housing has traditionally included shared facilities in the form of a meeting hall and a coin laundry, but as the 1970s began residents wanted greater communality. The students of the '60s had become parents and had taken on full-time jobs. Many had moved out of their communal setups, but, having experienced the advantages of a shared supportive home environment, they became advocates of extending the shared facilities of housing estates to incorporate many more activities. They wanted to share their lives and avoid the stress of having responsibility for everything themselves. They wanted to take turns cooking and grocery shopping, caring for children, the old, the sick, and each other. They wanted interaction with neighbors on many levels: gardening, sports, dancing, and singing, but also in talking over problems, discussing politics, and exchanging experiences, as well as sharing the work of running and maintaining a home environment.

Spurred in part by a Danish Building Research Institute competition in 1971, low-rise/high-density housing proliferated and the communal facilities grew in size and scope. At first they were contained in a separate building, like a sort of community house, while people made their homes in small unattached villas or in units joined together like town houses.

The community house would be a centrally located, freestanding building, which would be easily identifiable by signs and symbols and architectural form. It would contain multipurpose spaces, maybe a few guest rooms, storage rooms, a laundry room, and kitchen. In some cases special rooms for high-decibel music would be provided; in other cases, it would be a television room or a space with an open fireplace.

The nature and extent of shared activities/shared facilities all depended on the wishes of those who wanted to live in these new housing estates. The future owners or tenants were usually involved in the planning/programming/design process, and as a result they got more or less what they (after various compromises) wanted and could afford, and so a home environment could be created that reflected current needs rather than those of the past.

While it was expected that intense user involvement in the planning/design process might influence architectural expression, this did not happen. No new "folk architecture" appeared. (What is folk architecture, anyway?) The architects involved were still the designers. Some of them were ideologically into "popular architecture," and so these '70s and early '80s housing estates range in expression from a sort of neo-primitivism to village idyll to traditional regionalism. Of late, however, the architectural expression has, without losing its local and quality-focused character, incorporated more expressions of the international currents of the new spirit—postmodernism and new rationalism.

The involvement of future residents before and during design did, however, influence building types. Size and layout changed and new forms of buildings appeared. Issues of community and privacy were constantly being debated, and these led to different configurations in the layout of individual houses and the relationship of these to shared-activities spaces. Concerns for saving energy were always there, and integration became the password to architectural expression and building type.

As ideas developed, housing evolved in character from high-density suburban to a more urban environment. Suburban open spaces and roads were replaced by narrow streets and plazas, replicating the closeness and some of the variety of real inner-city areas.

In most cases motor vehicle traffic was relegated to peripheral roads, and the streets and plazas became comfortable and safe outdoor spaces for children and adults alike, who moved more of their activities into the street.

Come fall and winter, however, this sort of life style was stunted when rain and cold and occasional snowfalls forced people indoors. So, why not cover the street? This is exactly what has happened in some recent shared-facilities housing schemes. Streets and squares have been roofed in glass, which protects against the climate and provides a communal indoor extension to private houses while also linking centrally placed shared facilities.

A compact urban environment has been turned into one large structure, and a new building type has emerged.

One of the first of these structures to be built was Jystrup, designed by Tegnestuen Vandkunsten and completed in 1984. Twenty-one families formed a cooperative, commissioned architects, and set out investing their time and money in planning and building a place where they might live according to their needs and beliefs.

The planning process was, apparently, long and rather lively. Ideas and beliefs can be marvelous, but getting 40-odd individuals to agree on how to express them in a living environment of a new kind, and then, too, to convert this physical form into architecture, is another story.

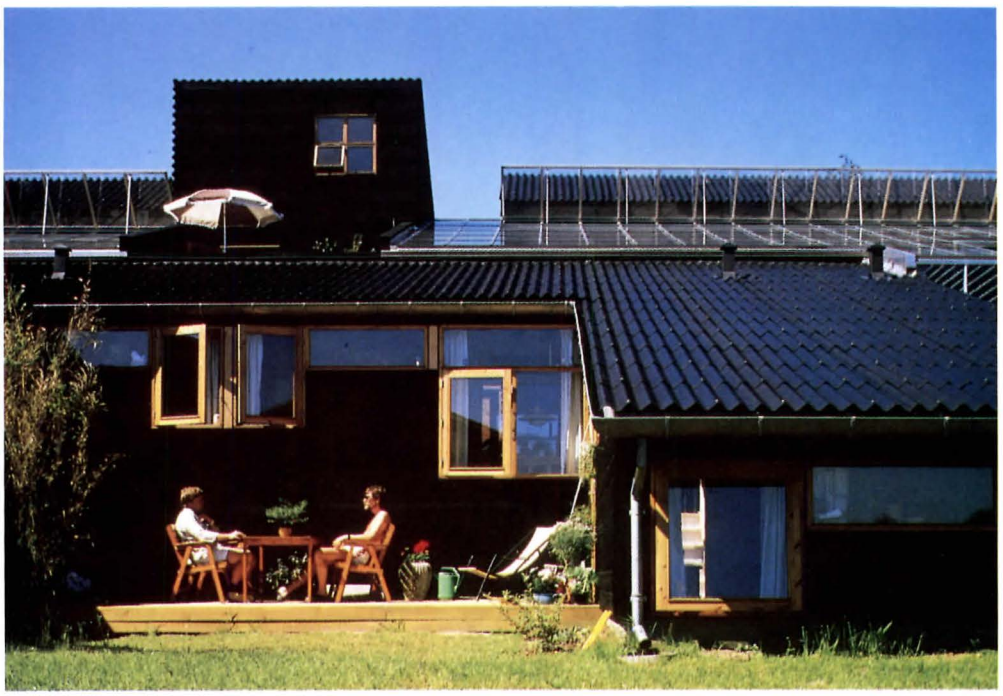
The project is an L-shaped building with communal facilities placed where two streets meet at the corner of the L. Twenty-one houses are placed along the glass-covered street, with two-story units to one side and one-story units to the other side. Blocks of units are staggered to create variation and form small squares in the street.

Each house has definite zones of privacy and community. Spaces shared by family members lie near the front and the center, toward the street, while individual private rooms are placed off to the side, toward the back, or on the second floor. There are private terraces at the backs of the houses and small balconies jutting out from the two-story units and set into the glass roof of the streets.

Just as it is possible to have privacy, at Jystrup one can be with people when one wants to. People take their sewing machines, their breakfast, their toys out into the street in front of their houses to share the company of neighbors.

For shared activities the large communal space where the two streets meet has

Jystrup, a shared-facilities community near Copenhagen, provides privacy of terraces behind individual units (right) and a sense of community fostered by an interior 'street' (below).



Photographs by Bodil Kjaer

apart from guest rooms and a library, a lounge, dining room, kitchen, and workshops. Most people eat dinner together, taking turns shopping, cooking, and cleaning up. If, occasionally, residents don't feel like eating together with 40 other people, they can pick up their dinner and take it to their home instead.

Jystrup is a traditionally built structure but incorporates a good number of prefabricated elements. Structural elements are made of laminated wood; roofs and some siding are corrugated eternite. Siding of the tower and dormers is waterproof plywood, while garden facades are covered in horizontal wood boarding. The interior street has concrete flagstones, while floors in the houses are made of ashwood.

While Jystrup *bofaellesskab* is a self-contained mini-community in the countryside close to a small village and within commuting distance from Copenhagen, Handvaerkerparken's *bofaellesskab* by Arkitektgruppen is an integrated part of an emerging large suburban housing estate on the outskirts of Denmark's second-largest city, Arhus. While Jystrup is occupied by its owners, Handvaerkerparken is inhabited by renters.

A 1982 law made it easier to finance nontraditional low-cost housing through public housing associations. While the early shared-facilities housing was privately financed and only available to the well-heeled, after 1982 such housing became available to almost everybody, whatever their level of income.

Handvaerkerparken, which will become a community of up to 3,000 people in 700 houses, is being built in stages. The third stage was ready for occupancy by the end of 1985.

The first two stages, completed in 1984, comprise 294 one- and two-story units, closely linked along narrow streets, small squares, and courtyards. These outdoor spaces vary in size, function, and design. Some are "hard" and paved, some are "soft" and garden-like, some are playgrounds, and some are for quiet occupation. Variety is everywhere, in size and shape and direction of buildings, in the individual houses. There are 12 types of units to choose from. Rooms are expressed in facades; wood-clad volumes are canti-

levered from the second story or lean against the first floor of yellow brick blocks.

Transition from one part to another of this community is emphasized by gateways with decorative open wood structures. Gateways frame vistas toward the shared-facilities houses and toward the surrounding green spaces.

By the pond of one of these green spaces lies Handvaerkerparken's *bofaellesskab*, a large building with an interior glass-covered street and a free-standing tower.

By the time a *bofaellesskab* was being considered, it attracted the attention of a number of people who wanted to live in a sharing situation. They joined the architects in the programming, planning, and design process, meeting with them every second week for two and a half years. They traveled together to visit communal setups and look at alternative energy solutions, and they studied historical precedents like Hadrian's villa outside Rome, Berlin's Charlottenhof by Schinkel, and the more recent Leon Krier project for St. Quentin in Paris. The cooperative process was intense and eventually led to a common awareness. Everybody began "to speak the same language."

As financial support was being extended by the Danish Building Development Council, experimentation could take place. This meant that when the design of the individual house as part of this large structure was being considered, a life-size mock-up could be built in a full-scale design simulation laboratory.

This laboratory has become an influential tool in the development of new solutions to problems of layout and construction in home building. It is state funded and run by researchers at the school of architecture at the Royal Academy in Copenhagen. Anybody can rent this laboratory or commission mock-ups built there, test ideas, modify and improve them, and maybe even get conflicts of interest resolved in the process.

Future residents of Handvaerkerparken, a couple of their architects, and technicians from the lab spent a week building a mock-up of a proposed two-story house. Then, when one could actually walk through, observe and try it out, further discussion ensued, and, after some rebuilding, the prototype was approved.

Above, long view of Handvaerkerparken's shared-facilities housing for 60. Facing page: left above, full-scale simulation used before constructing individual units; left below, a celebration in the 'indoor plaza'; right, a view into this low-cost community indicating its safety and appropriateness for all ages.

Since 20 percent of the entire building complex is devoted to shared facilities, the size of the individual units had to be diminished to conform to regulations for public housing.

This meant individual dwellings of a maximum of 800 square feet. Through the full-scale mock-up procedure, a small but larger-seeming unit was developed. Now, when it has been built as part of the larger structure, it seems a most pleasant house at $350 per month in rent. It has multi-purpose rooms rather than space designated as master bedroom, dining room, etc. It is designed as an open-ended place: residents may rebuild it inside or add "protusions" toward the outside. All 35 units have direct access to the outdoors and to the internal, covered street—and through that to the shared-facilities area

vith its workshops, dining room, kitchen, aundry room, sauna, and large multi-urpose space (an interior plaza) for ports, parties, acting, playing, etc.

Outside the centrally placed shared-ctivities areas by the pond is a small ower with a studio on the top floor and couple of one-room apartments below. They are there for visitors, but also for een-agers wanting to leave home but not et ready to be completely on their own. Should a couple split up, a one-room partment in the tower is a place where one may live for a while instead of having o move out of the community.

Handvaerkerparken's buildings are con-tructed from materials that are safe to ive with, are durable, will age well, and night even be reusable one day. It is quite feat, I think, to be able to produce low-cost housing of such quality as is found here. However traditional and crafted hese houses may appear, they are never-heless products of efficiently organized present-day building methods incorporat-ng a good deal of prefabrication.

—Bodil Kjaer

Ms. Kjaer is a Danish architect who has had her own practice for 20 years in England and France and is a professor at the University of Maryland.

Hungary

A Set of Works that Celebrate a City's History, Archaeology

It is probably no accident that Hungary's most promising young architect, 39-year-old Sandor Dévényi, works in the city of Pécs, as architect in charge of all inner-city restoration. It was also in Pécs, in the 1970s, that other young architects started what later became known as the New Wave, a vernacular-inspired movement akin to English romantic pragmatism. Two-thousand-year-old Pécs is laden with memories, recalled whenever a shovelful of earth is turned. Underground is a complex network of abandoned wine cellars and tunnels, some dating from the Roman era, as well as remains of Gothic buildings.

In his work, Dévényi celebrates Pécs's history and archaeology, and this is evident first in his two-story neoclassical apartment building addition of 1983. The original was built between 1792 and 1800 as an inn for travelers; its new wing replaced a part of the building damaged during World War II. "The new adapts the articulation and the rhythm of the old, except in reverse," says Dévényi. Where the old is solid, the new is void; the rusticated stones of the old become open space in the new, while the joint becomes in the new the solid iron rail of the apartment gallery. Where the new meets the old a cleavage is left not only to emphasize the entrance but to avoid a visual clash. The arch that interrupts the first-

Left, Dévényi's House of Happiness, serving most wedding needs, recalls earlier Pécs architecture in its exuberant eclecticism, including art nouveau stair rail, far left. Right, 1983 apartment addition; below, 1987 students' club carved out of underground tunnels.

loor gallery pays homage to the past and marks the carriage entrance of the old inn.

Dévényi's 1985 House of Happiness is located next to the municipal wedding hall and takes its name from its celebratory esthetic suggesting youthful exuberance, color, and gaiety and from its marriage-related functions—small hotel with bridal suite, florist, photographer, pastry shop, furnishings shop. It is rich in joyous detail: stepped windows, angled dormers, playful niches, an entrance flanked by a golden cupid statue, second-floor windows with cascading flowers, a sunlit courtyard with colorful umbrellas.

The exterior entrance, reached from a cheerful courtyard, has a pair of "Gothic" pillars whose articulated profile and setbacks conjure up medieval images. On the opposite side of the building, broken roof volumes, dormer windows, and luxuriantly detailed brick chimneys recall the townscape of Pécs as it must have been in the Middle Ages. Despite this playfulness, the building's solidity is underscored by whitewashed stucco and brick surfaces reminiscent of the simple massing of surrounding, substantial 18th- and 19th-century houses. Some of the details, like the mace-head decoration on top of the entrance pillars, also recall the architecture of the Ottomans, who ruled Hungary for over 150 years and built a well-preserved 16th-century mosque two blocks away. The interior stair leading up to the hotel part of the building is framed by wrought iron rails whose sinuous floral curves bring back the best of Continental art nouveau, another style familiar to Pécs.

Despite its differences from its neighbors, Dévényi's House of Happiness fits into this historic city remarkably well by respecting the height, scale, color, solidity, and roof proportions of nearby buildings and responds in an unabashedly eclectic, festful way.

Completed this summer, Dévényi's meticulously detailed students' club for the University of Pécs is a conversion of a portion of the city's abandoned wine cellar and tunnel system. The club is full of inventive forms and unexpected spatial experiences. "It refers to the mysticism of the underground world," says the architect. "I attempted to translate into architecture the contrast between the soft, water-worn shapes of the caves and the sharp-edged forms of crystals in order to express the tension one feels so deep beneath the surface of the earth."

Also completed in 1987 are Dévényi's interiors for a coffee house/bar/pastry shop in the center of Pécs, a few blocks from the city's famous visual symbol, its four-steepled, medieval cathedral. The architect provided spaces and seating for large numbers in a high-ceilinged room of limited size that was once an officers' club. At the same time, he created a stylized replica of the cathedral. Built of light-colored wood, it magically appears in the brilliant red room, rotated about 30 degrees, as if just unearthed from beneath layers of history. It solves the seating problem by creating a mezzanine level, provides a variety of seating—inside, outside, and on top of the cathedral—and is a conversation piece.

In Dévényi's hands, the pull of history and archaeology of place, the seeking of roots and their use open up new opportunities for invention.—JOHN MACSAI

Mr. Macsai has his own firm and is a professor of architecture at the University of Chicago. A native Hungarian, he regularly visits Hungary.

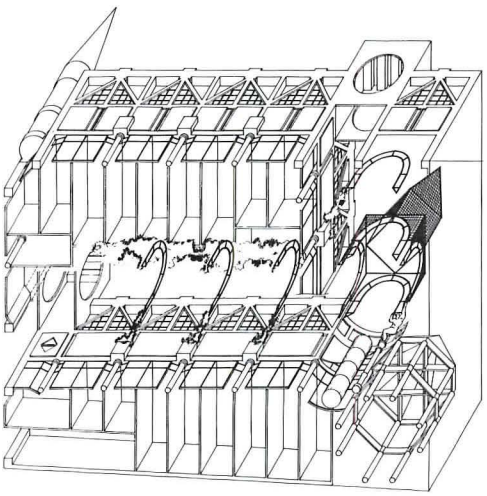
Argentina

Sturdy, Spired Shopping Arcade Links Landmarks

A centralized city of 1.2 million, Cordoba has a dense network of shopping arcades superimposed on its colonial grid. The oldest arcades are mere corridors in the interiors of blocks. They usually cross blocks and always occupy their centers, since the intention in piercing the built mass was to put commercial space into the "dead" parts of the large, square blocks.

The Paseo del Caminante by Miguel Angel Roca breaks away from this model: it is an open corridor, lined with shops, in a new, square building that occupies only one corner of a block. The 40,000-square-foot building links two landmarks, the Municipal Museum of Arts (a recycled 1910 house) and Santo Domingo Church, a neo-Renaissance building from 1880, with two elegant, blue-tiled domes and towers. The subtle design of the Paseo is full of allusions to both buildings that are always indirect, never literal.

Echoing the forms of the church are several "domes" suspended with metal bars. But these bodiless structures, unlike those of the church, rise from cylindrical drums in straight lines, forming a triangular profile. One, in glass, tops the staircase beside the coffee house at the end of the gallery to serve as a light source. Another



Far left, entrance, with rectangular, punched opening. Left, view of 'fifth' facade, showing skeletal 'vault.' Below, interior of arcade. Right, corner tower with old church spire in background.

completely skeletal, crowns the central portion of the gallery and turns a square space into a circular one.

The gallery is covered with a "vault" reminiscent of Santo Domingo's nave and of similar devices Roca used earlier to cover pedestrian streets in downtown. It reads as a street, even to balconies penetrating it, but bindweed plants will cover it as in covered Oriental bazaars.

The large rectangular openings of the gallery further recall the arched gates of the church that are set in rectangular frames. And by topping his building with plants and sculpture, Roca avoided too much contrast with the museum's delicate ornament or the church entablature.

The centerpiece of the gallery is the octagonal coffee shop, framed by two fountains and illuminated from the "dome" over its stair. Unfortunately, its furnishings are cheap, its detailing neglectful.

Overall, construction detailing and finishes are poor. The color, an intense pink, is startling in its environment of grays and subtle whites and is almost never used in Cordoba. Moreover, Roca's geometric shapes are flat, aspatial, and without weight. This is especially true of the exterior, which lacks the richness of the gallery with its false domes, vaults, and splashing fountains.

This building is far more abstract than other works by Roca in Cordoba. His is a synchronist philosophy of accommodation to particular circumstances. Here Roca's idea was, as he says, "to create a low building with a separate, though contextual, identity, and to underscore its urban elements—the street, galleries and corner."

—Marina Waisman

Ms. Waisman is editor of Summa *in Argentina.*

India

Temple Like 'a Lotus Bud, Its Petals Slowly Unfolding'

Based on the lotus, which is recognized in India as both a sacred flower and the symbol of purity, the Baha'i temple, by Iranian architect Fariburz Sahba, is on 14 acres in suburban Delhi. The land is elevated and the temple visible from miles away. It registers variously as a white tent with its sides billowing or as a lotus bud, its petals slowly unfolding.

Externally the form consists of two layers of nine petals, each one folding over the other, and an outer layer of entrance petal shells flaring outward. The temple has been placed at the site's highest point, with all subsidiary facilities—auditorium, library, and administrative offices—accommodated in the level below it. The grade and the lowering to basement level of four of the nine pools that surround the temple structure permit light and ventilation into these spaces.

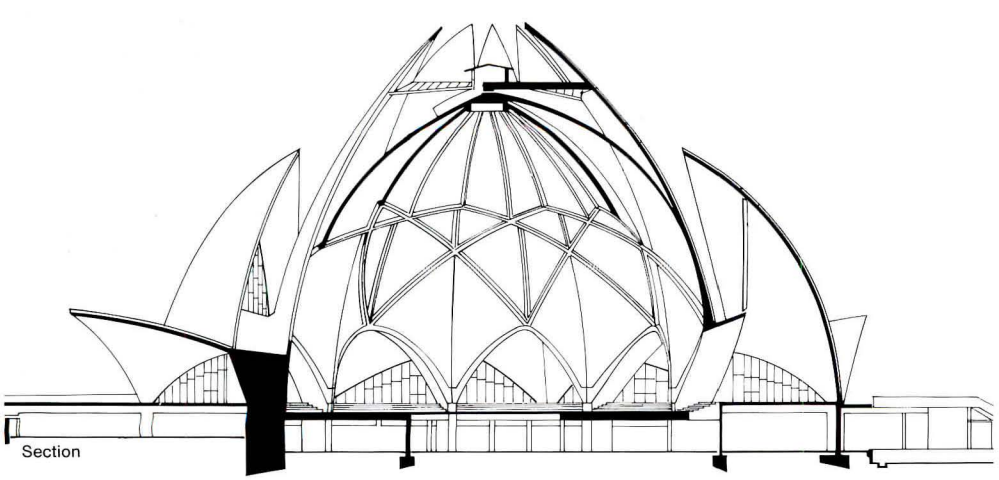
The plan form is simple and striking—a circular temple hall surrounded by nine pools and nine access stairs leading up to the ambulatory around the sanctuary. Various elements are integrated in an extremely complex manner with results that are deceptively simple. This is particularly apparent in the manner in which the inner dome is integrated with the form and structure of the outer shells. The inner dome, a complex ribbed structure in itself, not only reduces the scale in the hall of worship but also presents an exquisitely constructed folded womb to the flower, through whose intricate layers light filters in from above.

The main hall is a sunken circular chamber with two walkways around it, one inside, one outside. The inner walkway lies between the folds of the inner and outer petal shells, and glazing sheltered within the cusp of the outer petal shells brings light in from above. Projecting from the arched openings of the outer petal shells are the entrance shells reaching outward. They shade the inner ambulatory and shelter the outer walkway.

The building of this temple in India, with its limited technology, is a major achievement. Not only has a large and poured-in-place concrete structure been built on a scale never attempted before, but it has been done with loving care and meticulous attention to detail.

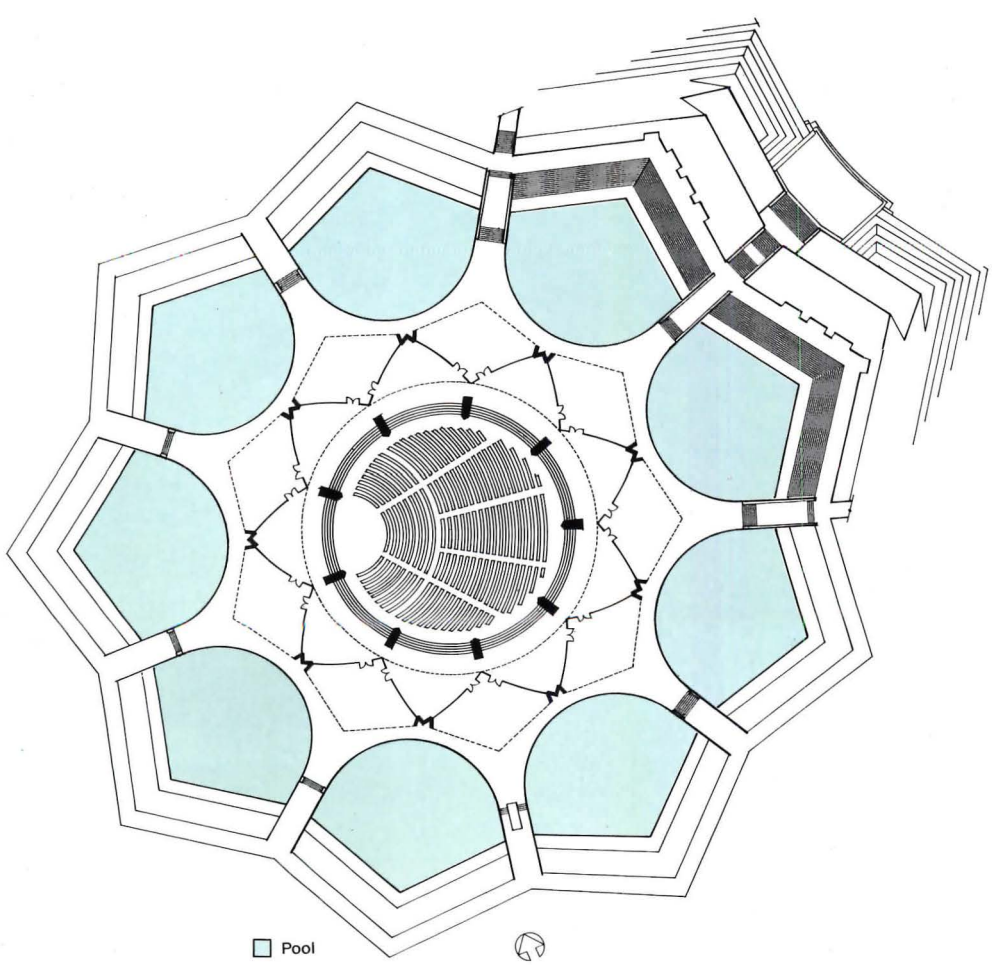
But the design is not without its failings. These are on several levels and relate mainly to design decisions. First is the ambivalence in orientation. Despite the strong axial approach leading up impressive steps to the main temple hall, one enters the hall by a set of doors that are identical to the doors set in the arched glazing on all the nine sides. Inside the entrance, the strongly defined circular ambulatory pulls one into a circular motion along the periphery. Perhaps this is not such a bad idea since the majority of visitors are not worshipers, but a focus or climax is lacking. The main worship chamber, set five steps below the surrounding walkway, is a circular space with seating facing a simple lectern.

Unlike the Sydney Opera House, which the temple resembles, the petals do not merely house an enclosed, artificially conditioned chamber. Here the modulation and articulation of light from the overhead central lantern, the filtering of it through layers of the inner dome, and the light from the side arches establish a strong spatial link between inside and outside.



Section

© Norman McGrath



Left, view from temple's circular sanctuary to ambulatory. Right, main entrance.

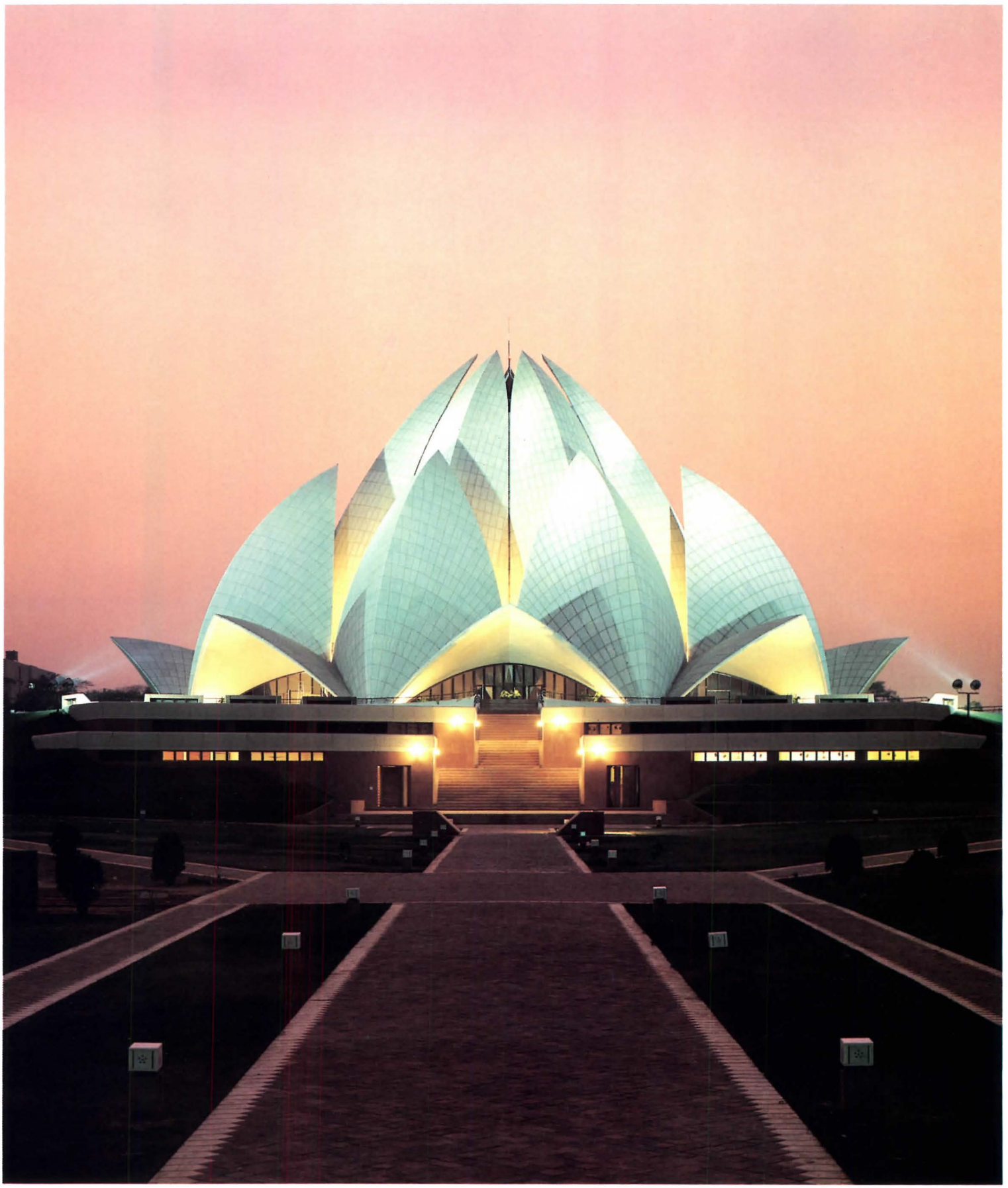
But this link itself distracts from the serenity of the prayer hall.

The skillfully hand-hammered white concrete on the underside of the dome and the inside of the shells provides a pleasantly sensuous surface defining the inside of the lotus flower. The same texture on the underside of the entrance petals also contrasts with the cold marble exterior very much in the manner of the inner surface of the petals of a flower or the inside of a newly unfurled leaf. The building's exterior surface, on the other hand, apart from being hard and crisp white marble, is dominated by the strong mechanical framing of the joint lines—a disturbing element on the exterior facade of the temple as seen close up. Fortunately, this network of lines disappears as one moves farther away. The best views of the temple are from a distance, from various points within the city.

The Baha'is believe in the oneness of humankind and in a single foundation of all religions. They do not have a clergy or rituals, and the temple is reserved purely as a place of worship. The hall has no images or pictures; the only element is the Baha'i symbol, also referred to as the Greatest Name. In the two centuries since the beginning of the religion, the Baha'is have built one mother temple on each of the seven continents, the Delhi temple being the latest. Each temple is unique, but in deference to the belief that each of the nine major world faiths is included in the message of Baha'ullah to humankind, each temple has nine sides and nine entrance portals. The number nine therefore has mystical significance for this religion, which seeks the spiritual and social unification of the human race transcending socio-historic boundaries.

At present the landscaping of the garden is incomplete, and many of the additional social institutions that will form part of the total complex have yet to be built. In time, when these facilities of school, library, hospital, and orphanage are functioning and the landscape has matured, the Baha'i temple complex will be fully integrated into the fabric of Indian life.—RANJIT SABIKHI

Mr. Sabikhi, a New Delhi architect, received an Aga Khan award for architecture in 1980 and has been a visiting critic at Harvard and Washington University, St. Louis.



Thailand

New University Campus Rises from A Matrix of Water

The Thammasat University project outside of Bangkok is designed by one of Southeast Asia's most prominent architects, Sumet Jumsai. Although still under construction, it indicates a serious effort to combine traditional qualities with modern requirements in architectural design—particularly in Thailand, where postmodernism has attained unbelievable heights of frivolousness. "Dr. Sumet," as the architect is familiarly known, is well prepared to combat some of the more ludicrous trends that have appeared in Thai architecture. A graduate of the Cambridge University (U.K.) school of architecture in the 1960s, where he studied with Colin Rowe and witnessed Le Corbusier accepting an honorary degree there, Jumsai has credentials of a strongly modernist coloring. However, he is deeply attached to the history and culture of his part of the world. What better opportunity than a new educational institution at Rangsit to attempt to bring together pertinent traditions of both East and West?

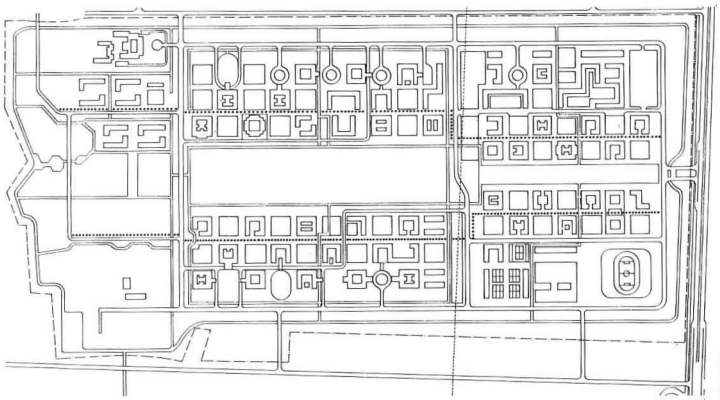
Thammasat University, founded in 1934, is on a cramped site near the Grand Palace in Bangkok and has about 10,000 students. A new site of about 1,000 acres, 25 miles north of the city, was acquired 17 years ago to accommodate expansion. It is adjacent to an existing international university for science and technology, the Asian Institute of Technology, and to various colleges, industrial complexes, and a new town.

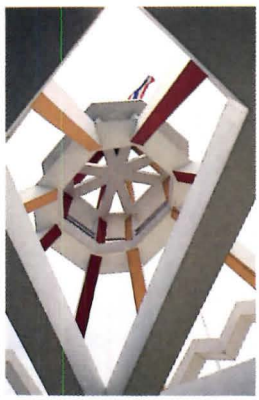
The master plan by Sumet Jumsai and Associates was selected in a competition organized in 1984. Among the major constraints was the site's location on flat land that is flooded every year for four months. Authorities already had begun constructing flood protection embankments prior to the competition. While the architect was required to accept this network as a given, he and his team realigned the canals and storage lakes along the lines of the prestigious Angkor Wat temple complex in nearby Cambodia. Water then became the matrix that inspired other grids of roadways, walkways, bicycle paths, buildings, parks, and quadrangles. The canal system also provides a network for boating and recreation and gives the campus a traditional feeling.

Although the master plan is unified by very strong axes, it is nevertheless an

Above, library; right, administration building with spire.

Left, view into spire; beneath it, pavilion and covered walkway, with administration in background. Below, central lecture building from court.





Profile

SJA

Profile

aggregate of numerous square building sites. It takes into account the constraints and uncertainty of government budgets so that buildings can be implemented almost ad hoc in relatively small but self-contained grids that are automatically linked functionally and visually to the whole.

All of the five buildings Sumet designed for the first phase of construction are 64.4 meters square with an internal courtyard 31.2 meters square and a basic column gird 7.8 meters on center. Hence, several of the buildings are actually set up on stilts, or pilotis, such as the library, which stands in a body of water like the libraries of traditional Thai monasteries (water acting then to deter both termites and thieves). All the buildings are reinforced concrete with prefabricated floor panels and steel trusses for the roofs, which are covered with corrugated asbestos, whose color, nonetheless, is taken from traditional tile.

In keeping with its geographical setting, Thammasat's reference to traditional elements may be regarded as a shorthand transformation of these into a modern idiom. That is, prominent roofs to structures on stilts—either in actuality or in expression—allude to older forms of Thai domestic architecture, yet the terms are kept abstact enough to remain convincing.

Apart from the functional advantages of the high roofs and overhanging eaves for protection against the sun and torrential rains and for good ventilation, these elements provide a carefully controlled esthetic in which there are no direct transfers of traditional structural or decorative motifs, in the way of a collage. The only exception might be the "sculptural" tower, or spire, in front of the administration ("Dom") building, included at the client's request as a symbol to link the new with the old campus in downtown Bangkok. Otherwise, such traditional elements as projecting balconies overlooking the internal courtyard of the "Dom" building, or the gable profile used to accentuate various axes, are features that evoke rather than make explicit reference to Thai architecture of the past.

—Brian Brace Taylor

Mr. Taylor is executive editor of Mimar, Architecture in Development.

New Zealand

Music Center at Once Subversive And Conformist

There is a commonly held perception in New Zealand that makes the city of Auckland its most "Americanized" environment. Although not the administrative capital of the nation, Auckland justifiably lays claim to a commercial supremacy that carries with it all those trappings of up-market, high-technology, fast-paced life style so closely associated with urban America.

The result, architecturally, is a city of mirrors—of short (by American standards), squat, stubby high-rise concrete frames clad in tight-fitting mirror-glass raincoats. It is the wafer-thin imagery of a downtown biscuit factory.

But there exists another facet to Auckland—a laid-back, loose-jointed culture born of an occasionally subtropical climate, a tradition of long evenings in deep verandas, and the largest Polynesian population of any city in the world.

It is precisely this cultural collision that the architecture firm Manning/Mitchell thrives on. And, to further intensify creative tension, Jack Manning and David Mitchell are themselves, like many other architectural twin sets, sharply contrasting in personality. Manning is the quiet, undemonstrative matrix, cementing everything together; Mitchell is simultaneously water and aggregate, spinning constantly in a drum of wild ideas. Both architects are informed idealists—urbane and cynical, but always optimistic.

All of which aptly describes their remarkable little invention for the music school at Auckland University, a building sufficiently subversive to race the pulse of a counterculture, yet conformist enough to pacify the paranoia of a nervous status quo.

Such ability to negotiate the extremes of opposites without falling into the anonymous blur of middle ground is a rare and enviable talent. The music school confounds the convenience of architectural pigeonholing—it is simply a building of its time and its region, conceived by architects with a happy commitment to the possibility of champagne for beer money, and born faithfully of the somewhat rigorous circumstances of its gestation.

The site is adjacent to a busy, noisy city street—hardly ideal for an institution devoted to the exploration of silence—and is part of an environment dominated by university buildings typical of the overweight concrete/glass brutality of the 1960s. We now live in a leaner, meaner age, and the budget for the music school was, to say the least, ungenerous.

Manning and Mitchell have fashioned architecture out of such adversity as much by *attitude* as anything else. They pursued the intelligent pragmatism of low technology as a means of overcoming the considerable difficulties of noise control; and they utilized inexpensive materials and construction methods, as far as possible, to mollify the money men.

The large, curved, plastered wall to the street is the most evident strategy for silence, successfully deflecting street noise back into itself. But it does (and was doubtless intended to do) rather more than that: in its public aspect it serves as a gentle and painterly backdrop to two recycled porticos (one used as entrance, the other as a bus stop) and a lone palm tree; while on its private side it begets a sunny, sensuous, concentric courtyard that serves both the social and contemplative dimensions of the school.

This device of double (even triple) function pervades the planning of the building to such a degree that it becomes impossible to discern the primary motivation. Were the music-study balconies, for example, intended principally as sound buffers, with the resultant extended space, opportunity for fresh air, and association with the courtyard an incidental bonus? Or did it happen the other way 'round? Was the music theater so positioned to neatly complete the central courtyard on its southern boundary, or is it simply placed as far as possible from the clamor of the street?

It matters not. All these ideas work beautifully together, and all—quite probably—were simultaneously imagined. This is an architecture of considerable assurance.

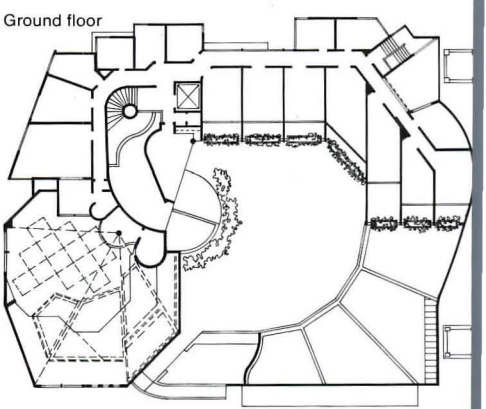
The confidence extends with nonchalant dexterity into the form making. In what must be one of the most eclectic essays in New Zealand architectural history, the music school is alive with an astonishing array of geometries and junctions, color and cornucopia, materials and metaphors, exemplifications and eccentricities. Inevitably, such barely controlled chaos has its moments of indiscipline (offering as much relief as regret, the human touch of minor error), but what finally lends it the cohesion of a genuine architecture is the sheer dominant power of the original idea—the street, the wall, and the courtyard.

They make music together.

—Gerald Melling

Mr. Melling is an architect and former editor of New Zealand Architect.

Ground floor



Facing page, left, main entrance; right, street elevation. This page, two views of the courtyard.

Norway

Pleasantly Jumbled Complex Creates An Urban Oasis

Norwegian architect Blå Strek writes here about his housing and office building in Tromsø.

Tromsø, northern Norway's largest city, is on the border of European civilization. Its contact with the Continent, Russia, Finland, and the Barents Sea has always been important. While most Norwegian cities north of Trondheim were damaged, and many completely destroyed, in World War II, Tromsø emerged almost untouched, its center of late 19th-century, empire style, wooden buildings nearly intact. These stand side by side with new construction of the last 30 years, resulting in an environment filled with conflicts and contrasts, often quirky but never indifferent. Such is the spirit also of our project.

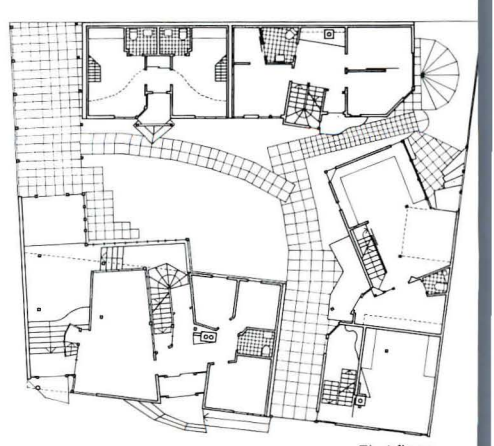
It is a pilot project for future development in the city center. It is close to the main street and consists of three residences, a small building of bedroom/sitting rooms, and an office building for the Norwegian Federation of Reindeer Laps. The area consists of back-to-back lots with little space between two-story buildings and with passages leading from the street to courtyards. The buildings are characterized by rich details, an active use of color, and a multitude of styles upon which we built while adding new elements.

Our buildings have entrances from the backyard, therefore making the backyard a public oasis in the city shaped by the buildings' forms. The streetscape, meanwhile, is echoed by the buildings' saddle-shaped roofs.

The site is narrow and surrounded by buildings on three sides. Our dwellings are on four levels with roof terraces. Details, use of materials, and color vary from house to house.

The first house has its short side toward the south, and the roof terrace has been pulled into the house to bring direct sunlight to the inner rooms.

Another house has two-story glazing (green walls) on the south side, and the



First floor

Facing page, project consists of varied cluster amid diverse neighbors; below, glassy exteriors. This page, above, street view; right, an interior.

basement receives daylight from the floor above. It also has a tower that differentiates it from the other buildings. In the third house, the roof terrace is above the living room, whose sloped glass ceilings on each side supply natural light. Daylight from the roof terrace also brightens the stairway and bedroom.

The design of the office building was influenced by features from its predecessor on the site, but these appear in different shapes. As in the houses, glass has been used extensively to provide daylight. But we conceived of this building as an urban office with Laplander associations.

Overall, repetition has been deliberately avoided. In this way we have been influenced by present tendencies in which many things are allowed to happen at the same time. Is the variety overkill? We think the final result is in harmony with the area. It looks as if the buildings have been there a long time.—Blå Strek

Greece

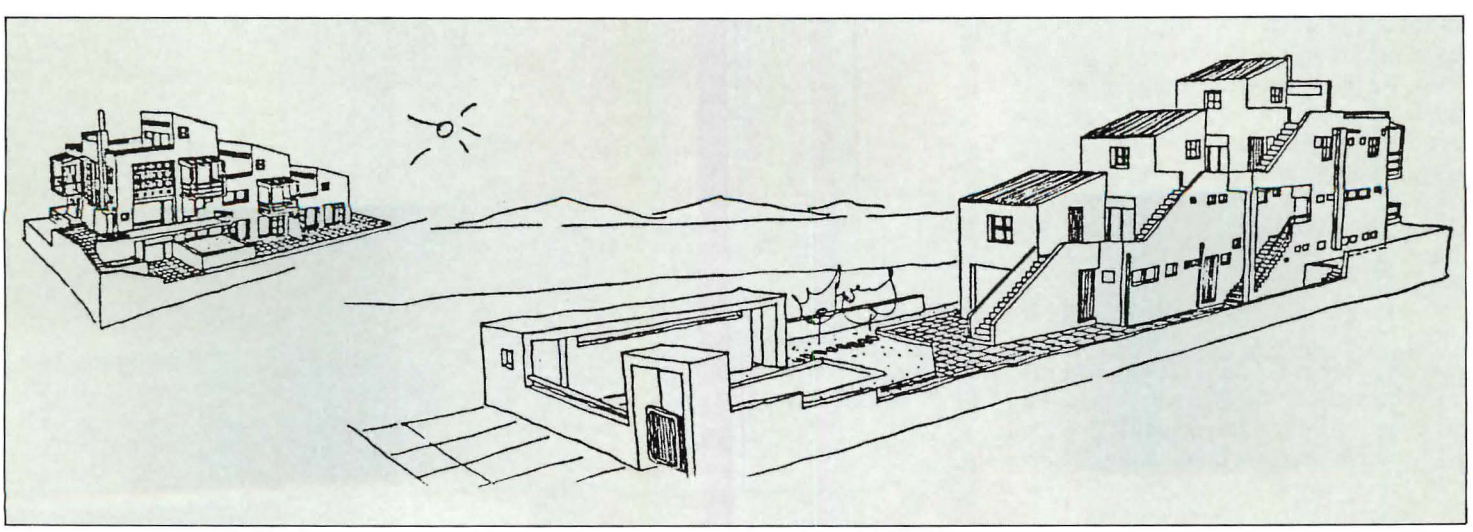
Housing Complex Takes Its Form From the Hilltowns

Anthony C. Antoniades, AIA, is a professor of architecture at the University of Texas at Arlington who also has a practice in Greece. Here he writes about one of his buildings near Athens.

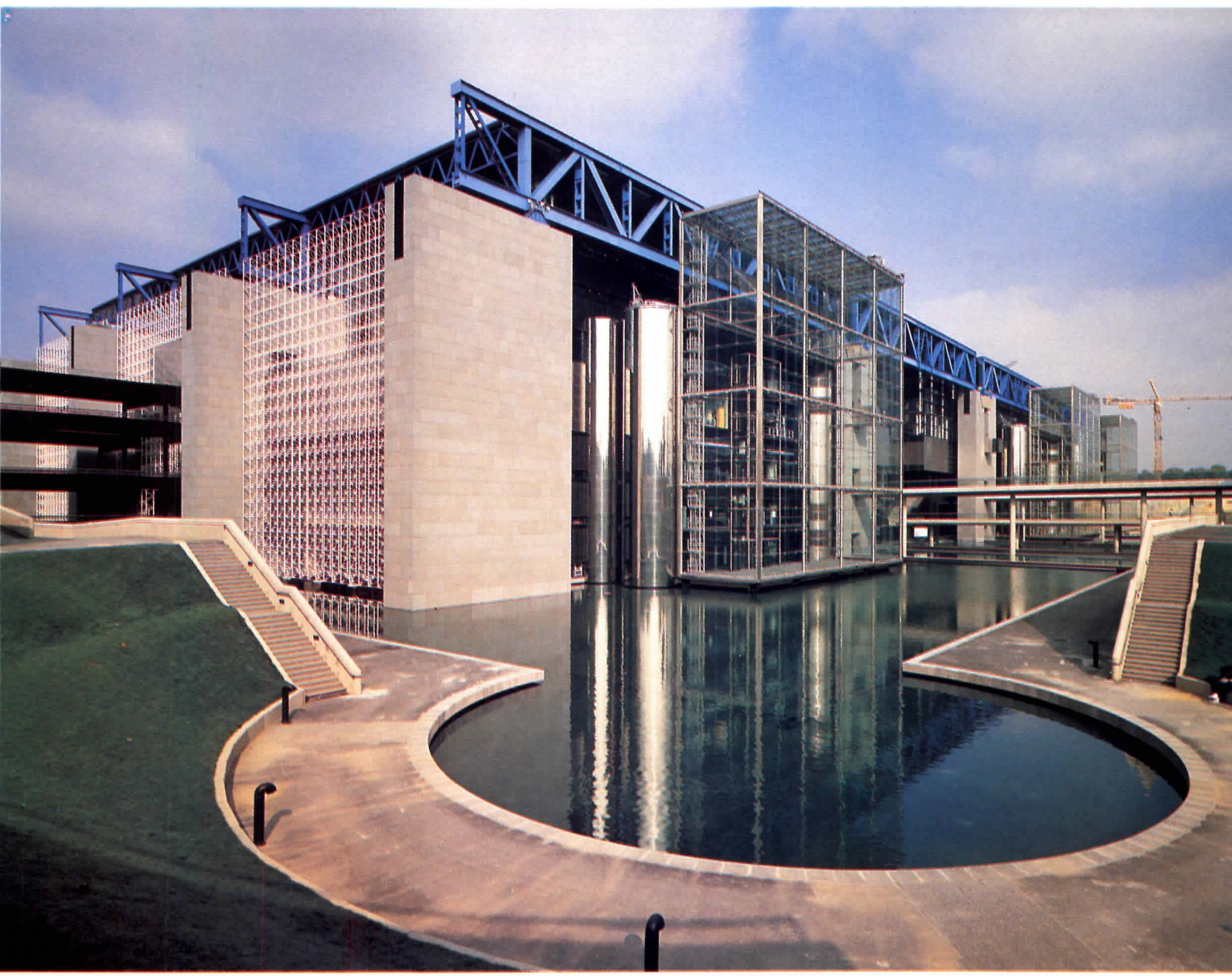
These dwellings in Saronis, a seaside suburb of Athens, challenge the defunct model of the typical Athenian condominium, *polykatoikia,* based on Le Corbusier's *casa domino* prototype. Among the prototype's problems are pilotis that create unpleasant spaces at grade—usually turned into unattractive parking—and other antisocial qualities created, for instance, by interior stairs and dark communal corridors.

Unlike others working in Greek housing, I considered it appropriate to turn to the extraordinary repository of Greek island and hilltown architecture for prototypes. Their sculptural articulation and plasticity were original to the place of their origin, and they are dear to the Greek people. During the conceptual stage, I had in mind children at play, their constant movement up and down hilltown stairs, and scenes of island elders relaxing at their doorsteps, welcoming guests, gardening, washing the pavements, or being preoccupied with other ceremonial tasks of vernacular tidiness.

We decided that the rhythm of the exterior stairs should become the visible communal element, a hilltown ascending to the sky.—Anthony C. Antoniades, AIA



France



Unused Abattoir Becomes a Bristling Science Museum

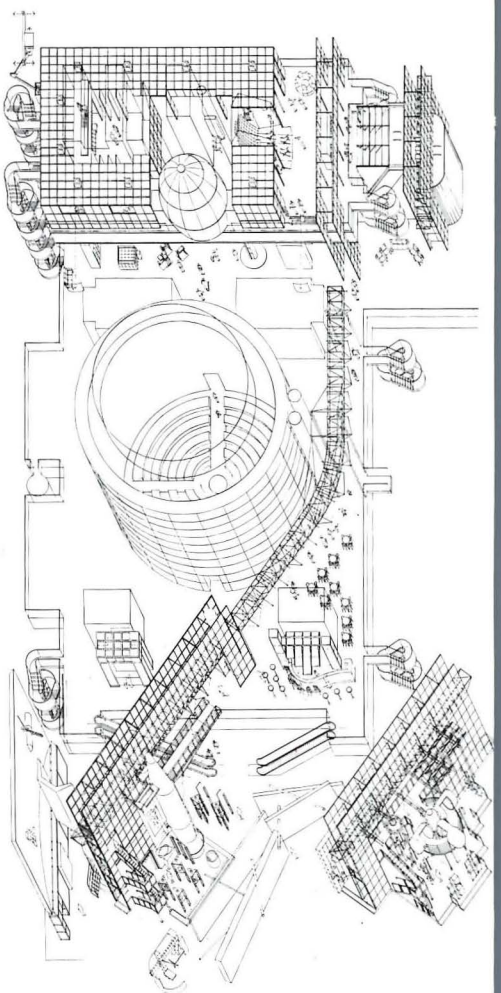
Opening the new La Villette "Science City" in Paris last year was something of a gamble. It was far from finished and at least a quarter of its permanent exhibition area remains empty to this day. But President Mitterrand had made quite plain that this museum of science and industry was to be opened to the public while he still had majority support in Parliament. The museum's inauguration was timed to coincide with the March 13, 1986, space probe of Halley's comet, when the French parliamentary elections were only hours away. Even so, the day before the opening, the building was breathtakingly chaotic as—amid frenzied hammering and sawing—swarms of camera crews, photographers, journalists, cleaners, landscapers with trolley-loads of plants, anxious administrators, public relations people, and parties of privileged previewers obstructed staff in last-minute tasks.

However politically expedient, the unusual notion of opening a new but unfinished museum in the middle of a building site has proved remarkably successful. As work progresses on the museum and its surroundings, they have become a kind of living exhibit in their own right. Despite increased admission charges as more displays are completed, it is difficult not to go back, again and again, to see what has changed. And there could hardly be a better way of demonstrating that something at last is happening in a large but long unused chunk of Paris than to provide a major public attraction there, with plenty of evidence of more in the making all around.

La Villette had long been the main Paris abattoir, but after the war its facilities were deemed outdated. Healthier, modern accommodation was planned in the form of a vast concrete meat-trading and slaughterhouse complex intended to surpass any such facility anywhere in the

Left, the former meat-trading center with glazed bays and moat around earlier basements. Right, entrance foyer rises to roof with twin top-lights.

A. M. Butzbach



world. It turned out to be a spectacular error of judgment, for even as construction was under way it became far more economical to transport frozen carcasses to Paris than to bring live animals there for slaughter. Before the new complex was properly complete, meat trading had dwindled, then ceased altogether, at La Villette, leaving a new but useless building, an abortive expenditure of several billion francs, and considerable political embarrassment in its wake.

Plans to use this huge 10-acre white elephant of a building as a museum were launched in Valery Giscard d'Estaing's presidency. Adrien Fainsilber was commissioned architect upon his winning a limited competition in 1980 with designs for converting the redundant meat-trading complex and providing around it a new public park with avenues of trees.

But, as is the way with architectural commissions for major state projects in France, Fainsilber saw his overall design whittled away. The park was shelved and a new design was sought with an international competition won in 1983 by Bernard Tschumi. Fainsilber's idea of providing the museum building with solar collectors, in the form of great glazed bays along the south elevation, was abandoned in favor of conventional airconditioning. The glazed bays were retained as an architectural feature, but the British firm Rice-Francis-Ritchie was commissioned to design them and the twin top-lights over the main entrance foyer. Other architects were brought in to design the museum's permanent displays. And regardless of the museum's projected size—1.6 million square feet, two and a half times the area, and nearly four times the volume, of Beaubourg—the museum staff fought over every square foot, even suggesting that the impressive top-lit entrance foyer be redesigned to create more exhibition space.

As built, Fainsilber's conversion of the meat-trading complex consists in essence of digging a sort of moat around the former basements, thus increasing the building's apparent height and providing the means to set it in a shallow lake, while carving out parts of the interior to provide the requisite display, administrative, and ancillary accommodation, reached in the main from the vast foyer rising from entrance level to the underside of the roof. He has achieved a bold but suitably restrained overall coherence by his use of both finishes (Gauloises blue paint for the now exposed lattice roof trusses retained from the original building, stone cladding, acres of plain wood-block floor) and simple geometric forms (for lift and escape stair enclosures and the like).

If the late addition of airconditioning resulted in somewhat erratically draped ductwork within the building, Fainsilber's approach has certainly succeeded in providing an overall monumentality of scale against which any display or exhibition appears anecdotal and impermanent. As a further bonus, the building's sheer size allows more than enough space for younger visitors to let off steam without seriously threatening the exhibits—an essential consideration in a museum that attracts school parties in considerable numbers.

For all the administrative obstacles put in Fainsilber's way, the building as a whole has a pleasantly relaxed atmosphere, especially when compared with Paris's almost exactly contemporary Orsay museum, where the manifest muddle seems to have sprung from a combination of confused thinking and cold feet, leading to the architectural broth being spoiled by far too many cooks. No doubt Fainsilber's task at La Villette was rendered a mite easier because, as nobody considered the meat-trading center of architectural or historical significance, he was able to use it uninhibitedly, as a very raw material, in his conversion.

But that is not to belittle his achievement. Considering the now notorious tendency of French civil servants to mangle both the designs and the designers for major state projects, Fainsilber has managed a remarkable job through his dogged determination to see realized to his own exacting standards the areas of the La Villette "Science City" remaining under his control. This personal tour de force must have been instrumental in his deservedly being awarded the *Grand Prix d'Architecture* earlier this year.

—Charlotte Ellis

Ms. Ellis is an architect and freelance writer living in Paris.

Holland

Fragmented, Light-Filled Behemoth in A Delicate Setting

When Dutch architect Theo Bosch started designing a new language studies facility for the University of Amsterdam, the primary problem was how to insert a large structure—328 feet (100 meters) long and nine stories high—into the existing cityscape. "The scale had to respect the old city," he explains. Complicating the situation, the building was to be located alongside a prominent canal and thus visible from some distance.

Bosch resolved these problems with panache, dividing the mass into what appears to be five smaller buildings maintaining a verticality compatible with the neighbors. At his insistence, old buildings at either end of the new facility were retained. On the south, the white-tiled, yellow-trimmed Witte Huis, an 1899 Jugendstil structure, not only was incorporated into the complex but served as the basis for color selection.

The language facility's exterior is divided horizontally and vertically through variety in articulation to indicate the program, says Bosch. Bay windows denote private offices, for example, while the flat skin indicates more public spaces. Although the facade appears to have overall uniformity, Bosch says that there is in fact great differentiation in the number of window mullions per bay.

The zigs and zags in the facade serve a variety of functions, not the least of which is to control views from the interior. Bosch wanted very much for the students to be oriented to the outside at all times. "It gives you contact with the city," he notes. These deep cuts, front and back, which reduce the building to only 2½ meters thick at some points, provide great views for the building's users, and also bring natural light deep into the facility.

If there is a single overpowering impression, it is the quantity and quality of this light, which literally bathes the entire inside. A double-loaded interior street divides each floor and is the main organizing feature of the plan. Various projections and recesses along this corridor mimic the exterior and provide a feeling of smaller buildings within the larger structure. But all is open, and users can see everything happening in this very

Left, the building is massed and articulated to complement neighbors. Right, interiors, transparent and wonderfully lit, are organized around 'streets.'

public building. Interior partitions and elevators are glazed, there is a light well at one end, and floors are cut away to create double-height spaces. The basement is lit from a plinth inset with glass block on the front and back of the ground floor. The irregularity of the interior street also serves to help disguise the fact that the building is a trapezoid, with ends 65 feet (20 meters) and 80 feet (25 meters) wide.

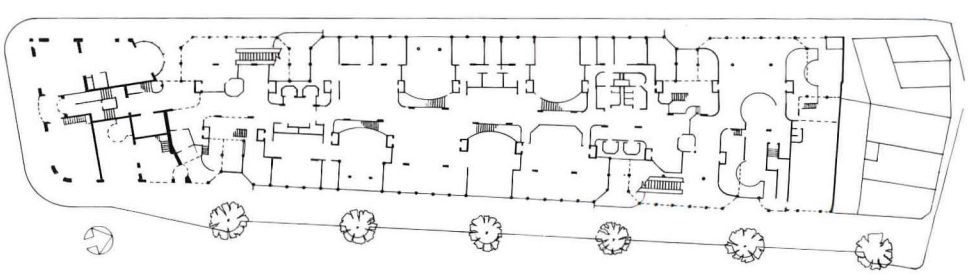
In a city with a wealth of architectural detail, the building's limited but simple ornamentation is a delight visually. The concrete columns at the two-story entrance, for example, have ghostlike notches to express the joining point for nonexistent beams. Operable shades to cut sun glare are attached to the exterior like oversized moldings at the tops of windows. Finally, a huge cranelike structure resembling that found on a ship is in place on the roof. It is the window-washing apparatus, and, in contrast to most American buildings where such equipment is hidden, here it is treated as a piece of sculpture that rolls on a track.

Overall, the detailing is exquisite, from the magnificently finished, poured-in-place, concrete-framed interior (the exterior is precast) to the stylized capitals topping the columns. Vibrant colors—yellow, orange, blue, green—are used inside to denote floors, while the exterior is composed of the pearl-gray concrete, yellow trim, and blue railings. Many ceilings are covered with unpainted, natural-finished plywood panels, which, although inexpensive, provide a touch of elegance and soften the harshness of the concrete. A number of the details, such as the windows and styling of the concrete columns as well as the use of color, derive from Van Eyck's and Bosch's earlier Home for Single Mothers, also in Amsterdam. The open plan and relationship to existing older buildings are also similar to those of the 1982 building.

As to a final grade for the language building, one must look to the users, and they have provided an answer. Many more students than anticipated have signed up for classes in the building. That is attributed in large measure to the architecture.—Carleton Knight III

Mr. Knight was a valued contributing editor until his death earlier this year.

Ron Zijlstra



England

Stirling at the Tate: 'Garish' Entry Hall, 'Neutral' Galleries

Photographs © Richard Bryant

The opening of the Clore Gallery of the Tate in London this April marked the homecoming of two of Britain's most famous prodigal sons. After more than a century in scattered storerooms, the vast collection of works by J. M. W. Turner is finally on public display under one roof in its rightful home. The building's architects, James Stirling, Michael Wilford & Associates, although busy abroad, have not built in the United Kingdom for nearly 20 years.

The Tate, built in 1887, has been extended numerous times throughout its history, with galleries added in a piecemeal fashion behind its neoclassical facade. The Clore Gallery is the first extension that is both an independent building with its own entrance and part of the Tate. It is the first phase of an expansion program for the site north of the existing museum, master-planned by Stirling, which will become a cluster of museums. When complete, the Tate will finally be able to fulfill its function as the showplace for British art of all ages.

The Clore Gallery is a four-level, L-shaped building flanking a south-facing garden court. Stirling has consciously designed the sepulchral-shaped, glazed entrance aperture, which is turned 90 degrees, as the inverse of the stately portico and grand stair leading up to the piano nobile, frontal entrance of the Tate. The new gallery is approached by descending several steps to a paved court and reflecting pool.

The route to the galleries, rather than being axial and direct like the existing

Left, with Tate; above, Clore entrance.

building, is a zigzag path that maximizes the sense of procession in a relatively modest area. From the entrance, visitors turn left to the reception, then right to ascend a grand stair, then left along a balcony overlooking the entrance hall with a final jog around the side of an enormous arched window into the first gallery. In addition to changes of direction, Stirling exploits a full range of volumetric and lighting conditions and an extensive palette of strong colors to dramatize the route to the galleries, from the tall, top-lit, peach-colored stairwell to the low, dark balcony alongside with a deep purple balustrade.

Following the grand trek to gallery level, a more discreet stair at each end of the long, narrow hall continues up to the reserve galleries. Stirling has designed the circulation system for promenades and people-watching, carefully positioning windows and balconies at each level. At the west end of the hall a semicircular balcony at third-floor level functions both as an entrance porch and as an overlook into the first of the Turner galleries. Here the mood swiftly changes from razzmatazz to restraint.

Because the Turner collection is finite and the grouping for display is generally agreed among historians, there is no requirement for flexibility. The nine galleries are fixed rooms, including two rooms to the north of the first gallery and six rooms organized on a main axis to the south. With the exception of the water-

color room, all galleries are daylit. Early conceptual sketches showed greenhouse-type lights like those Stirling used at Stuttgart. However, the more onerous technical requirements of the Tate led Stirling to a light scoop roof section also used at the Sackler and derived from Aalto's museum at Aalborg. External louvers on the roof lights enable the gallery to be blacked out when closed to the public and, together with the scoops, prevent direct daylight from hitting the walls. The uneven and unpredictable quality of light is allowed to shine through, contributing to the strong atmospheric feeling of much of Turner's work.

Each gallery also has a system of computer-controlled artificial lighting concealed in a recessed slot around the perimeter of the room and a central track of spotlights. The difference between daylight, which in England is cool, and the warm color of the electric lights completely transforms both the galleries and the paintings.

A half-round picture rail marks the bottom edge of the heavily sculpted, white plastered ceilings that are strongly defined in light and shadow. Below the rail, the gallery walls, covered in beige linen, are bathed in light. At the base of the walls, oak skirting conceals electrical trunking, and beige carpet in all rooms is framed by a band of oak flooring at the perimeter. The openings between galleries have oak architraves with winglike up-lights suspended from the plastered heads of the openings. The only counterpoint within the galleries is provided by a small bay window and seating area overlooking the entrance court and the Thames. In an understated way, this small space successfully links the introverted galleries to the world beyond.

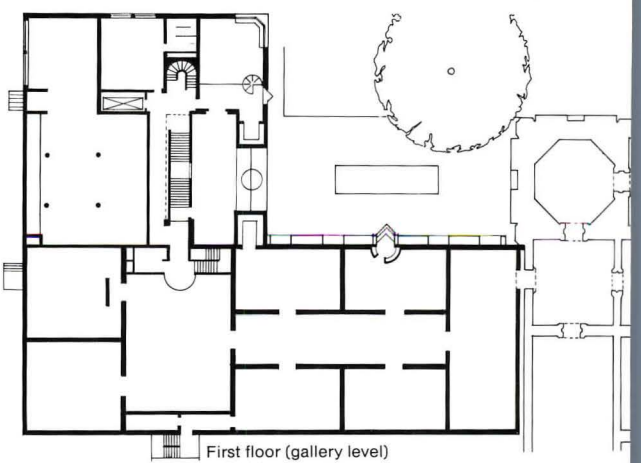
The simplicity of the galleries has attracted as much critical comment as the garish entrance hall. However, the emphasis and contrast seem correct, with each providing relief from the other and the galleries offering a calm, neutral backdrop for Turner's paintings.

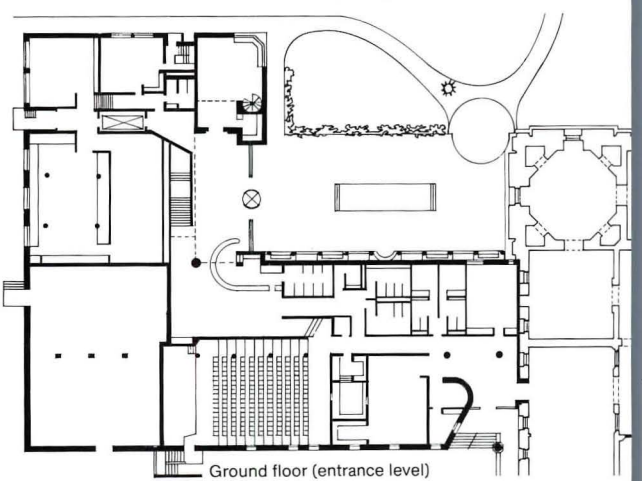
The three reserve galleries are less successful, depending entirely on artificial lights concealed in a ponderous ceiling. Because these rooms are for public storage, paintings are hung above one another to the ceiling. The paintings at high level are difficult to see because of glare.

Externally, Stirling has redefined the concept of contextualism. Each elevation of the building relates specifically to its surroundings. The public facades are clad in a neutral grid of Portland stone infilled with ochre-colored render when relating to the Tate and with panels of red brick when responding to the preserved Edwardian buildings on the site. The transition never occurs on corners but slides along elevations. The back of the building is unceremoniously clad with yellow bricks set off by brightly colored ducts, vents, and service doors. Although Stirling uses traditional materials for contextual reasons, he makes it clear that they are used unconventionally. Unsupported bricks above the corner window of the reading room emphasize that the skin is veneer.

Some details are enjoyable, especially for architects. The lime-green glazing mullions, a Stirling signature, call attention to apertures in the external wall. The rhythm of the massive timber pergola in the entrance court plays off four bays against the five bays of the adjacent

Left, entrance stair and stairwell; right, the obverse view.





facade. The projecting rest area bay is central on the external facade but off axis internally. Mortar joints in the red brick panels are flush, while those in the yellow brick panels are deeply raked.

Other details are provocative. The handrail on one side of the grand stair is oak; the other is Day-Glo pink tubular steel. The single column in the entrance hall is composed of two cubes rotated on a cylindrical base. Some of the attention lavished on these details might have been spent on the obtrusive air grilles and on the gallery display cabinets, which are clunky and uninspired. The fundamental question of quality also arises in a country that has a poor record on maintaining buildings. Some vulnerable parts of this heavily used public building—like the plastered, painted balustrades—already show wear.

Top, public storage gallery with artificial light; above, gallery combining artificial and natural light. Right, Tate from Clore entrance, with paved courtyard.

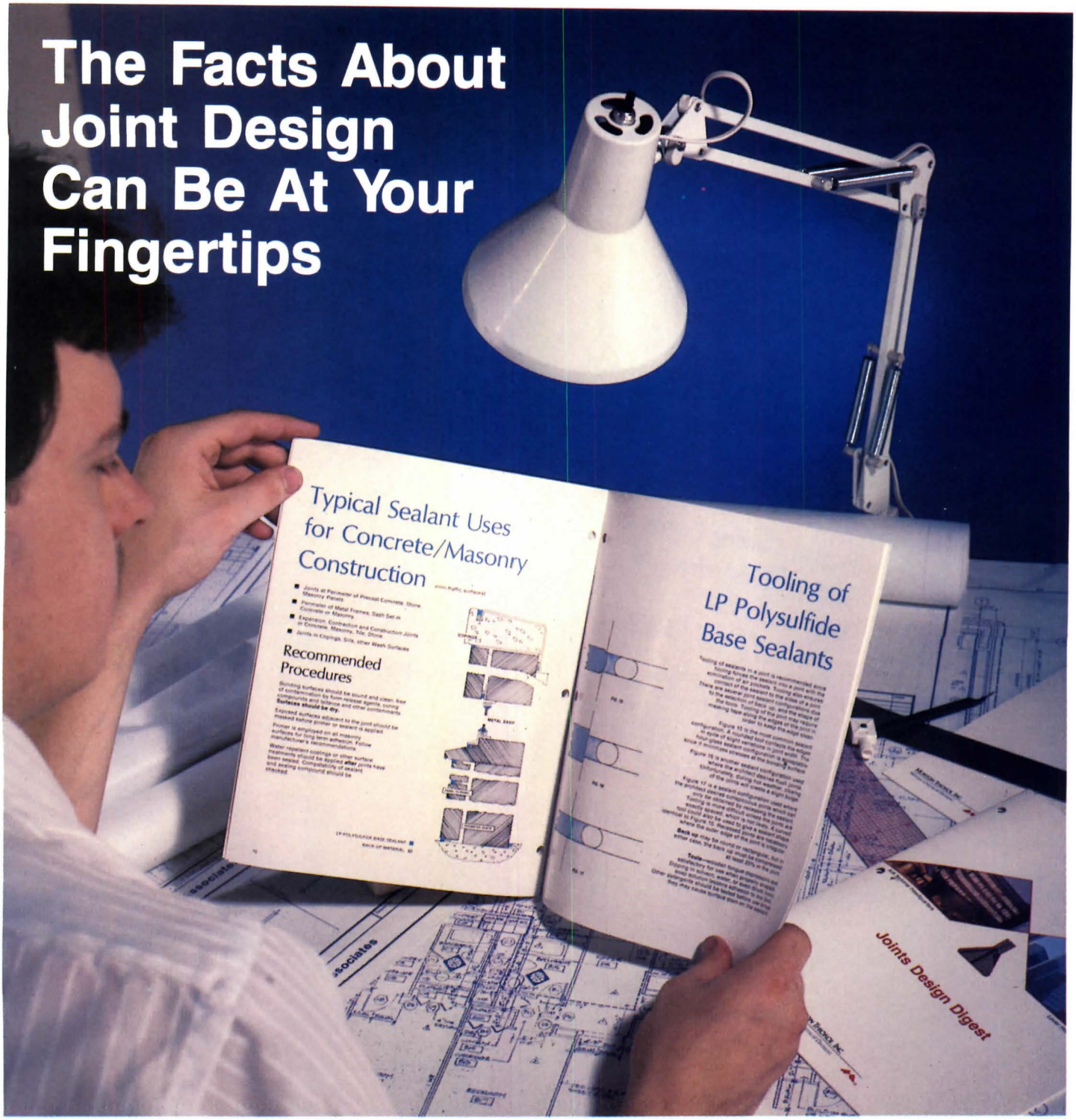
The Clore Gallery is a fine sequence of interior spaces. Externally, it is a strident building that, while professing to be contextual, calls attention to itself as a quirky object. Eccentricity is one of the most highly valued English characteristics, and, in this respect, Stirling stretches the limits of architectural tolerance. It is good to have him home again.

—Annette LeCuyer

Ms. LeCuyer is an architect and writer based in London.

© Richard Bryant

The Facts About Joint Design Can Be At Your Fingertips



How much movement will take place in ten foot concrete panels? How wide should joints be for structural steel, stainless steel based on a movement capability of ±25%? How deep should a 1/2 inch concrete joint be to withstand movement?

The Joints Design Digest will tell you. It's a good reference guide to keep on file. And it's written to help you design the right types of joints for sealants based on LP® liquid polysulfide polymers...the polymers that have been serving the building construction trades for more than three decades.

Send for your copy of the Joints Design Digest today! You'll have the facts on joint design whenever you need them.

MORTON THIOKOL, INC.
Morton Chemical Division

Mkt. Comm. A • 333 W. Wacker Drive • Chicago, Illinois 60606-1292

Circle 28 on information card

®Registered trademark

A Global Look at Construction

Building researchers from around the world gather in congress.
By Douglas E. Gordon and M. Stephanie Stubbs

Every three years, the congress of the International Council for Building Research, Studies and Documentation (CIB) serves as a barometer of current interests among building science researchers around the globe. Published reports of the most recent congress, held last September in Washington, D.C., indicate a broad range of interests in the United States, Canada, France, and the United Kingdom, while, not surprisingly, developing countries are more concerned with situations closer to home. In fact, for most of the research—represented by more than 700 papers from 55 countries—applicability of the findings seems more regional than global.

Housing was a key concern in preparation for 1987, the United Nations year of sheltering the homeless. A quest for cheap building materials is tempered by concerns for structural stability and nontoxicity. A particularly common topic of affordable materials research is the suitability of indigenous materials as concrete additives. Disaster mitigation and materials research are two common areas of the "CIB.86" congress's research that have direct applicability to architects in the United States. Closer to the realm of pure research are the papers on computer-aided design and drafting, which delve into the possibilities of "expert systems" (a generation of software as yet unavailable on the open market). From the cornucopia of regional and global research presented at CIB.86, five major topics emerge: problems of developing nations, indigenous materials for concrete/masonry additives, disaster mitigation and climate-responsive design, materials and structures research, and knowledge-based and expert systems.

Problems of developing nations

Because one of the main topics of CIB.86 was shelter for the homeless, it is no surprise that the majority of the papers describing work in developing countries dealt with the problems associated with providing adequate and appropriate shelter. Topics of the papers ranged from alternative building materials to new methods of financing both construction and ownership of low-cost dwelling units.

For instance, L.K. Afele, with the United Nations' Economic Commission in Addis Ababa, Ethiopia, offered a paper entitled *Mutually Guaranteed, Quasi-Barter Mortgage—Financing Mechanism for the Homeless.* While employed with a mortgage bank, the author attempted to develop a financing mechanism for low-income earners (70 percent of the African population). Given that conventional Western mortgaging, introduced to the region in the 1960s, had a high loan delinquency rate, the author believes that traditional means of financing—personal savings and informal loans among friends—could work better as a mortgage system for low-income earners.

Afele proposes a mortgage system based on the mutual exchange of comparative resources among the homeless, the government, and the mortgage banks to minimize the magnitude of cash requirements of the homeless. In simple terms, the government would take the initiative to develop infrastructure (including schools and health facilities) that would create markets for local building materials, such as clay bricks produced with unskilled labor supplied by the homeless. The mortgage financing institution would serve as an intermediary to supply the marginal financing needs. Similarly, part of the building materials supply produced by the homeless would be used to build houses for them, thus creating the quasi-barter system with the government. Because the government is considered a credit-worthy guarantor, the lending institutions would be less likely to fear default of loans made against the building materials stocks.

Modern Trends in Rural Housing, presented by Khalid Matmood, from the civil engineering department of King Abdulaziz University in Jeddah, Saudi Arabia, outlines materials and construction methods currently used in the rural areas of Pakistan. Matmood contends that the rural population is consciously taking steps to build stable and durable houses that will not suffer the damage that generally occurs during natural disasters. These steps include using materials that are standard in developed countries, such as fired bricks, concrete, and steel, and using newly developed materials, such as cement-stabilized soil blocks and bamboo for concrete reinforcement.

Matmood recognizes as significant the contribution of new materials to rural housing but cautions against current construction methods. Often, construction using the new materials is undertaken by semiskilled people who learned their trades working on larger building projects in urban areas. Because the workers lack the knowledge to adjust what they have learned to smaller, residential projects, the result is often waste of materials, a poor end product, and sometimes collapse of the structure. Furthermore, Matmood sees an insufficient understanding of seismic design requirements. Matmood's recommendations include preparing standard designs for rural buildings and providing training centers in rural areas to educate laborers in the use of modern materials and standard construction practices.

Prospects and Strategies for Local Building Materials Development in Africa, by A.A. Hammond of the Building and Road Research Institute in Kumasi, Ghana, identifies raw building materials available in Africa (grouped into soil/laterite and stone, binder, clay products, wood, and other types) as well as technologies for converting them into building components.

Hammond maintains that African governments cannot expect satisfactory economic development unless they are prepared to take an active role in the development of a comprehensive approach to the housing problem. He cites current problems of rapid urban growth, dependence on an unreliable supply of imported building materials, and an inability to capitalize on traditional materials. Hammond contends that the African continent has all the material resources and fuel for power that

it needs for producing an adequate supply of building materials. To turn the tide, Hammond recommends immediate remedial production measures on existing manufacturing plants; feasibility studies before new production facilities are built; multicountry production of specific building materials; standardization of building materials within regions; and government promotion of locally produced materials in public buildings.

Many projects from India indicate the importance of building materials and low-cost shelter as research topics in that country. For example, G.C. Mathur of the National Buildings Organization in New Delhi presents the age-old practice of self-help housing in *Self-Built Housing Technology.* His thesis is that self-help technology must be upgraded to suit modern requirements of safety, durability, and livability. The author maintains that self-help construction of housing and local production of building materials can lower the cost of house building by 40 to 50 percent. However, to maximize this effort, appropriate materials and technologies must be chosen. Mathur presents six case studies of exemplary self-help housing projects. They include improved mud houses made of sun-dried bricks, bamboo-reinforced mud walls, and local timber seasoned in solar kilns.

A second project from India, *Economic Foundations and Fired Clay Bricks in Expansive Clays,* by Dinesh Mohan of the Central Building Research Institute in Roorkee, presents the findings of field investigations and scientific studies of highly expansive clay soils, such as the native "black cotton" soil. These studies have led to innovative pile foundation systems and to fly ash and basalt fines additives for earth bricks. "Black cotton" clay normally makes poor quality bricks, but the studies show that these additives permit manufacture of suitable non-load-bearing panels, as well as an adequate filler material for reinforced concrete or steel frames.

Another of Mohan's major findings indicates that there is no appreciable ground movement in black clay soils beyond a depth of 3.5 meters. So if foundations in this type of soil are anchored at that depth, there is no effective ground movement and the superstructure of the building is not subject to consequential cracking. The study has resulted in development of bored, cast-in-place concrete piles with bulb-shaped bottoms. These piles use less concrete than large, uniform-diameter piles.

Indigenous concrete and masonry additives

One topic that surfaces in research from developed and developing countries alike is additives to concrete and masonry projects. While some researchers explore additives such as silica fume to create superconcretes for multistory towers, others search for cheap (in many cases, waste and byproduct) additives to improve low-cost construction.

Arjun Dass of the Central Building Research Institute, Roorkee, India, presented a paper entitled *Coconut-Pith Ash as a Pozzolana.* A byproduct of the coconut harvest, more than a million tons of coconut pith are available each year. When the pith is burned, it produces an ash that shows fairly good pozzolanic properties. The paper explains preparation of the ash and X-ray analysis results of its crystalline formation and tells how it can be produced and used in small-scale operations.

More than 400 dwelling units have been constructed of new, lime-based materials, developed in support of research carried out at the Central Building Research Institute in Roorkee. N.G. Dave, in his paper *Research to Practice: Construction of All-Lime Houses,* reports on the use of lime-based materials, which have resulted in savings of 7 to 18 percent on each project. The institute has conducted studies on various combinations of lime and pozzolana, conversion of lime kiln byproducts in binders, and lime/stone masonry blocks. In a similar vein, *Selection of Suitable Lime Waste Material Proportions for Masonry Cement Production,* by M.A. Cincotto and colleagues of Sao Paulo, Brazil, reports the results of plasticity, water retention, and compressive strength tests on 45 different combinations of three types of lime and four waste-material binders (rice husk ash, ceramic residue, fly ash, and blast furnace slag).

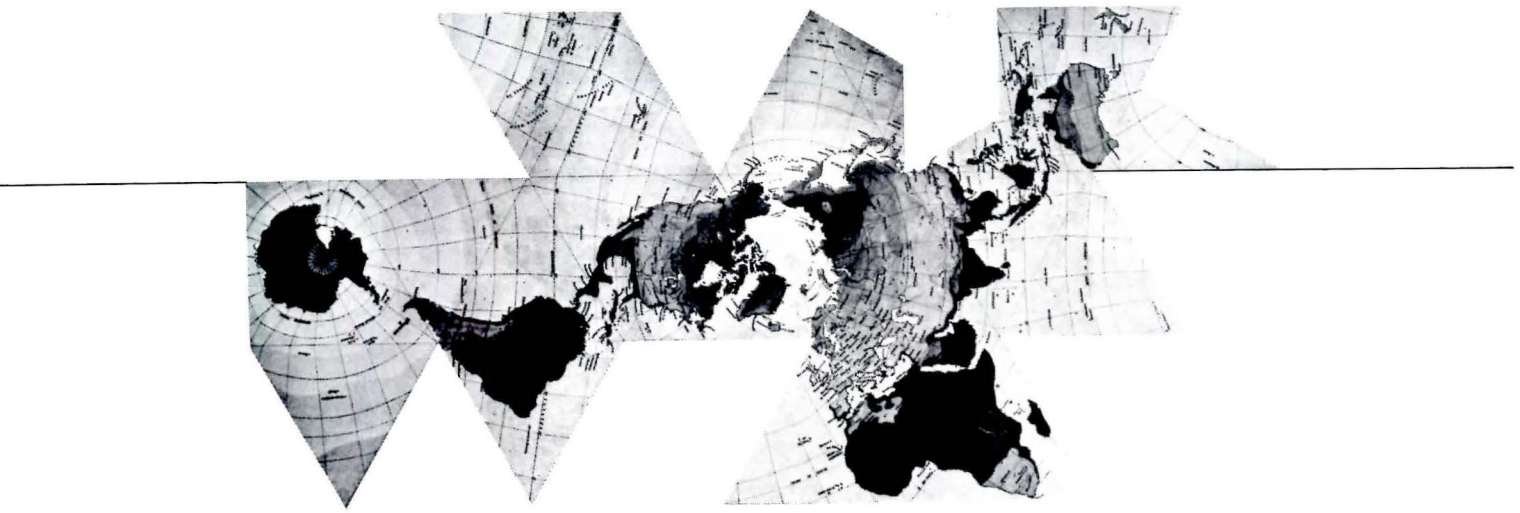
A.S. Mawenya, a consulting engineer from Dar es Salaam, Tanzania, presents in *Sisal Fiber Reinforced Concrete Production* a technology indigenous to eastern and southern Africa. Sisal fibers, which inhibit early cracking as well as increase the durability and strength of concrete, have been used for molded, corrugated roofing panels that have been manufactured and successfully applied in many rural, self-help projects. Mawenya advocates their widespread use through commercial production methods.

Julian Salas and others from the Instituto Eduardo Torroja de la Construccion y del Cement in Madrid, Spain, reported on an extensive experimental low-cost housing program in *Low-cost Concrete Based on Industrial Byproducts: Fly Ash.* The program studies various ratios of cement to fly ash, as well as different types of fly ash, and their effects on the compressive strength of the resulting concretes. The authors presented another paper, *Small Panels with a Rice Husk Concrete Base,* reporting the results of bending and compression tests on experimental panels made with rice husk as a concrete additive.

Properties of Lightweight Aggregate Concrete Made with Ethiopian Pumice and Scoria, by Mikyas Abayneh of the Faculty of Technology of Addis Ababa, Ethiopia, explains advantages of using lightweight aggregate concretes made with the pumice and scoria (rough, cindery lava) abundant in East Africa. Abayneh predicts that systematic study of these types of lightweight concretes, particularly to determine optimum water/cement/aggregate ratios and particle sizes, will lead to their widespread use.

The economy of fly ash blocks was also the topic of a paper entitled *Housing Construction of Non-Cement Silicate Blocks in Shanghai,* by Xi Zheng Xiu of the Shanghai Research Institute of Building Research. Xi says that, due to the scarcity of land, production of traditional clay blocks will soon be very limited, and noncement fly ash blocks will remain one of the main industrial systems of housing in Shanghai. Xi therefore concludes that further research and improvement of this type of construction will grow in importance. The paper also contains recommendations for block laying procedures and techniques.

A caution in the use of waste material as an aggregate for concrete block comes from Lloyd E. Rodway of Klohn Leonoff Ltd. in Calgary, Alberta, Canada. In his paper *Low Cost Concrete Block from Mine Waste,* Rodway outlines a case study of a large education complex built in Zambia of concrete blocks containing waste material generated through mining copper. Five years after construction, massive deterioration of these blocks occurred after exposure to monsoon rains. Sulfates in the mine waste, in the presence of cement and water, formed a mineral with a much greater volume than the original cement/water paste, causing slow disintegration due to expansive forces in the block. Rodway concludes that there are definable limits to the amount of contaminants acceptable in waste materials used in concrete production.



Design for climate and disaster mitigation

Protection of buildings from natural disasters captures the interest of researchers worldwide. Earthquakes, floods, and fire draw no boundaries between developed and developing nations and offer a seemingly endless supply of potential improvements in the construction industry.

Bushfire-Resistant Housing—Design, Operation, and Building Controls, by Max Granger of the Cement and Concrete Association of Australia, reports the results of a competition to design bushfire-resistant housing, precipitated by major bushfires (equivalent to U.S. forest fires) in 1983, which claimed 80 lives and destroyed 2,300 homes. The winning design was refined by information gleaned from inspections and research conducted in fire-stricken areas.

A bushfire-resistant house acts as an area of refuge during the fire. Physical factors of bushfires that determine design parameters are their long duration, unpredictable wind speed and direction, wind-borne debris, extreme temperatures, and high pressure differential between inside and outside the building. Design recommendations include a concrete, slab-on-grade floor; masonry or concrete walls, with masonry joints flush or near flush (raking concentrates heat and may cause calcination of the mortar); fire screens on windows and doors; and fire-resistant reinforced concrete slab roofs equipped with large drainage spouts to avoid ponding.

Seismic design is another major research interest around the world. From the school of architecture at Meijo University, Tempaku, Japan, comes a paper entitled *Anti-Seismic Design Support Expert System.* Researchers A. Miyamura, M. Murata, and S. Kao describe an expert system designed to enable a small structural engineering office to supply advice for seismic mitigation during the early stages of architectural design. The system provides an optimal layout of given earthquake-resistant elements (such as shear walls and braces) that is consistent with relevant building codes, architectural and environmental design requirements, and structural classifications.

Called the ISI-system, the program runs on a 32-bit super minicomputer. Designed in particular for use by junior engineers, it predicts ultimate-load resistance capacity and analyzes elastic/plastic vibration, coupled vibration of the building and the soil, artificial ground motion, and wind effects.

Oscar Hernandez Basillo of the Instituto de Investigaciones Electricas of Mexico also researches seismic effects on building design. In his paper *Earthquake Strength of Earth Construction,* Basillo explains shake table testing that was performed on 2x3-meter models of single-story houses. He tested the models first without reinforcement until significant damage occurred, and then with reinforcement until failure occurred.

Only methods of reinforcement that could be easily incorporated into existing adobe and masonry housing were chosen for the test. They included adding reinforced perimeter beams at the top, welded wire mesh in the walls, horizontal ties at the top of the walls, perimeter beams with vertical ties, and partition walls. The results indicated that even the least effective of the strengthening methods increases by a factor of two the seismic intensity that can be resisted without major damage.

The need to develop more earthquake-resistant masonry housing is also a priority in Peru, according to Daniel Torrealva of the Pontificia Universidad Catolica del Peru in Lima. *A Field and Laboratory Tested Technique for Retrofitting Adobe Houses in Seismic Areas* presents another research project in which shake table tests verified the value of reinforcement in adobe houses during simulated earthquakes. The researchers built full-size models of houses repaired and reinforced with welded wire mesh after the 1983 earthquake in Popayan. Construction techniques in the lab followed closely those used in the field.

Results of the shake table testing indicated that, although the reconstruction methods—nailing wire mesh to the walls and covering it with cement mortar—added significantly to the seismic resistance potential of the buildings, adding a strip of mesh horizontally at the roof level improves the potential even more. Torrealva recommends further testing to establish the minimum amount of mesh needed to prevent collapse.

Materials and structures research

Papers on materials and structures research run the gamut from new and improved nuts and bolts to buildings premanufactured and delivered to the site as a fait accompli.

From the Instituto de Pesquisas Technological in Sao Paulo, Brazil, comes a report entitled *GRG Prepared by Premixing for Wall Panels in Developing Countries.* Researcher V. Agopyan explains an inexpensive method for preparing glass-reinforced gypsum using commercial mixers. The material, composed of gypsum plaster and chopped E-glass fibers, was developed in the lab through a method that could easily be used on site by unskilled workers. The premixed compound is less affected by humid environments than is its matrix. This property, coupled with the material's low cost, should make glass-reinforced gypsum a viable substitute for traditional indoor brickwork, aerated concrete, and compound panels.

Researchers in Czechoslovakia are exploring the uses of integral foam concrete, which achieves a continuous change in density and physical properties along a building component's cross section. Jiri Panek and colleagues at the Faculty of Building Engineering in Prague report their findings in *Structural-Foam-Concrete of Ideal Stress and Density—Distribution of Building Elements,* in which they describe their search for a single building material that would perform structurally and esthetically like a layered, or sandwich, panel. They maintain that new methods of thermosetting enable construction of a mono-material foamed concrete panel that meets criteria of nonflammability, creep, and structural strength by varying the cross section (panels are dense at the outer edges and less dense toward the middle), placing the structural strength where it is

needed. The panels can be manufactured not only with the addition of plastics but with silicates as well.

On the Stress and Deformation Analysis of Building Pile Foundation Ground System, by Shintaro Yao of the school of architecture at Kansai University, Osaka, Japan, presents a structural analysis method for determining the seismic safety of a building's superstructure and foundation piles with the ground, all working together as a system. Yao asserts that stress and deformation evaluation procedures for grade beams, slabs, and piles are obscure and need to be clarified. His method takes into account the influences of rocking and swaying motions of the footings, as well as the behavior of pile groups and settlements due to pile construction methods. He proposes a bearing capacity formula and methods for determining vertical restoring force characteristics for cast-in-place piles, treating the system (piles, foundation, and the ground) as a whole.

Structural calculations for pile foundations were also the subject of investigation for a team of researchers from the Scientific Research Institute of the Ministry of Industrial Building of the U.S.S.R. Headed by B.V. Goncharov, the group presented a paper entitled *Automation of Calculation of Foundations on the Basis of Static Sounding Data.* The paper explains a series of computer programs to calculate pile bearing capacity on the basis of collecting pile sounding data using a 36-millimeter probe at a number of points along the depth of the pile. Based on the data collected, the computer constructs geotechnical profiles, graphically presented by a series of isolines that determine zones according to soil characteristics. The program also facilitates choice of the correct type of pile-driving hammer and the necessary pile impact strength.

To calculate foundation requirements on natural soils, the program relates collected sounding data to permissible soil bearing pressures. It then projects a numerical representation of the soil's geotechnical profile along the main axes of the building and indicates recommended dimensions of the foundations. The researchers estimate that this approach decreases the time necessary for soil investigation and foundation design by a factor of one and a half to two.

Ivan J. Markov of Yugoslavia, Joost C. Walraven of Germany, and Tino M.G. Pat of the Netherlands collaborated on a paper entitled *Steel Fibers as Punching Shear Reinforcement in Lightweight Concrete.* They presented experimental structural ramifications obtained by placing steel fibers in lightweight aggregate concrete used for slab-column connections. By varying the amount of steel fiber in the slabs, the researchers were able to establish a direct correlation between the fibers and both the ultimate punching load capacity and the post-failure capacity of the slabs. Steel fibers were more effective in resisting punching shear in slabs of lightweight aggregate concrete than in normal-weight concrete slabs.

The team also noted that steel fibers reduce the amount of shear cracking that occurs, because the fibers absorb the shear force by first deforming plastically, then sliding from the matrix, and finally rupturing before the concrete cracks extensively.

A Case Study of the First Experiments of Building With Box Units in Turkey, by Gonul Utkutug and Ziya Utkutug, explains the problems of industrialization in developing countries and details efforts to overcome the lack of infrastructure, scarcity of building materials and skilled labor, high cost of capital, and high inflation rate that currently plague the construction industry. The researchers maintain that a building system permitting total integration of rough construction on the assembly line is necessary to combat these problems, and they cite a project of the Yuksel Concrete Industry and Trade Co. as a model of a workable industrialized building system.

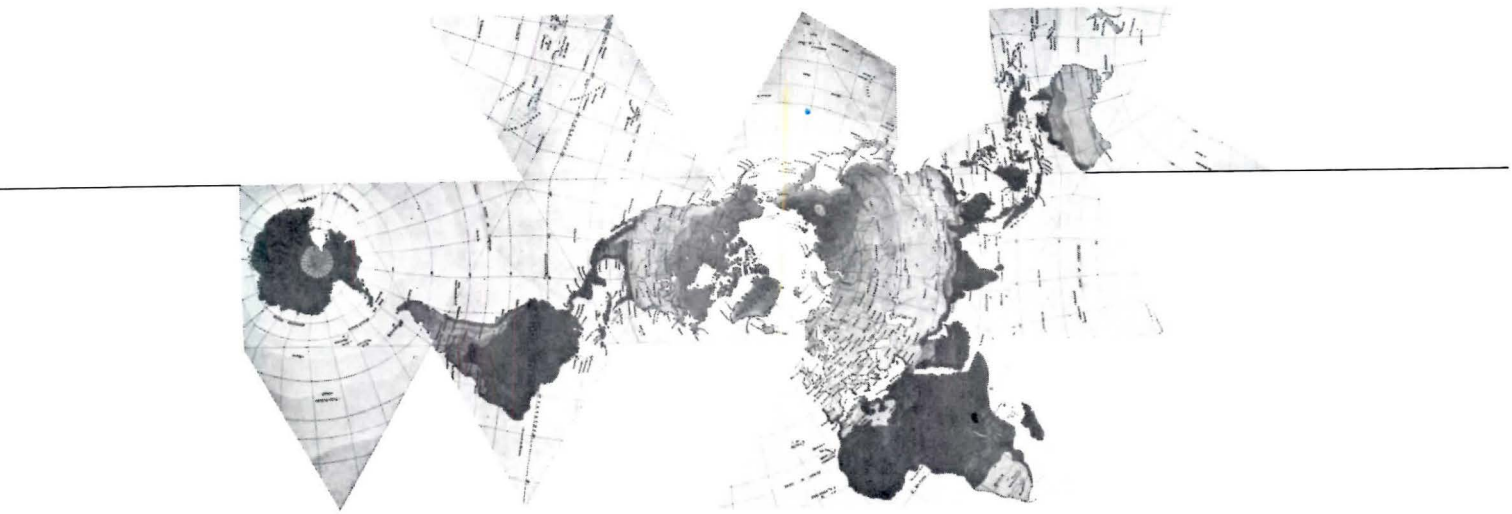
Since 1981 the company has manufactured modular cells measuring 2.8x9.6x3.1 meters and weighing 25 tons each. A cell consists of a prestressed floor panel carried by girders and two concrete portal frames, topped with a lightweight steel ceiling frame. Cast exterior wall panels are insulated and are not load bearing. The cell is prefabricated to 40 percent completion, with the rest of the construction finished by traditional methods on site. The authors conclude that, although such modular construction in Turkey is expensive compared with traditional methods, promotion of the technology, especially with the help of government incentives to entrepreneurs, would soon make the method cost effective.

With epoxy resins enabling the reconstruction and reinforcement of existing concrete structures—filling cracks, adhering concrete to concrete, and adhering sheet steel to concrete—important questions arise concerning the durability of joints, dimensions of reinforcing elements, effects of primary concrete cracking on reinforcing elements, and the effect of sheer forces on adhesives. Jerzy W. Jasienko and Andrzej B. Olejnik of Poland consider the external reinforcement with epoxied steel of concrete structures already under load in *The Theoretical and Practical Bases for Reinforcing the Bent Concrete Structures with External Bonded Reinforcement.* Some of the factors they found important to successful external reinforcement include the strength of the concrete and the dampness and roughness of its surface; the lateral dimensions (mainly thickness) of the bonded steel reinforcement, its modulus of elasticity, yield point, and surface preparation; the type of adhesive, its resistance to moisture and temperature, and the thickness of the bond; weather conditions during application and ongoing service; and the method of clamping together bonded elements.

External reinforcement takes the form of steel strips applied to the tension side of an already loaded beam. Measurements of distortion in middle cross sections of these beams have shown that, in cases of prestressed beams with internal reinforcement, the internal reinforcement reached its yield point sooner than the external reinforcement. The authors conclude that external reinforcement with enough deformability will allow internal and external reinforcements to reach their yield points at the same time. "When designing bonded external reinforcement for heavily stressed structures, it is necessary to take into consideration the existing state of stress in critical cross sections in order to adequately calculate the cross section of bonded reinforcement," they report. "When we have to deal with elements that are weak in tension, the external reinforcement should be calculated on the assumption that it carries all of the tensile stress."

Knowledge-based and expert systems

Basic CADD may be a new interest for many practicing architects, but it was the more exotic applications that drew interest at the CIB.86 congress. Knowledge-based and expert software systems are on the minds of world-class researchers. In general, knowledge-based systems, many of which are on the market now, interact with the architect, asking questions that lead the computer program (and architect) toward acceptable solutions. Expert systems have a higher degree of expertise built into their programs, allowing automation of the more routinized design



decisions, and they are still more promise than practice.

The Development of a Knowledge Based System for Setting an Economic Strategy in Building Design, by British researchers Peter S. Brandon and Sidney Newton, points out limitations in much of the predesign costing software that is generally available. There are different software packages that suit the needs of each participant in the building team, but few programs that can be used interactively by all, the researchers contend. The ideal would be a software package that considers the individual informational and operational needs of the architect, developer, client, engineer, and other consultants.

Brandon and Newton identified three knowledge areas—design, development appraisal, and cost advice—that are tied together in project design and development decisions. For instance, if the architect proposes to change single-pane glazing to double-pane glazing, the developer needs to know how the extra cost may affect financing for the project. The owner is also interested in the effect that the change will have on long-term energy costs. Likewise, proposed changes by the contractor or owner require reconsideration by the architect. A knowledge-based costing system allows each design team member to interact on the same data base yet not miss consequent changes that affect the other design team members.

The authors plan to examine the application of expert systems to project costing. "This system will include selection of the most appropriate building procurement path, financial budgeting, time forecasting, and probably development appraisal," they conclude.

R. Martin Skitmore of Great Britain seeks to improve predesign cost estimating through an expert system that incorporates a better understanding of how cost estimators "mentalize" the cost of a project. In his paper *Towards an Expert Conceptual Estimating System,* Skitmore explains that the most commonly automated technique of cost estimation is based on detailed consideration of design variables and is not a very accurate depiction of costing and bidding.

Estimators depend not so much on an itemized breakdown of construction costs as on what is acceptable within a given market. Design development, materials specification, and construction all take shape from the market-driven budgetary parameters formed at the outset of project development, Skitmore says. Thus, he notes, cost estimators often are skilled at arriving at a price for a project even though they don't know what the project will actually cost to build.

With costing so susceptible to subjective analysis, it makes little sense to automate a cost estimating process based solely on materials and time data bases of similar past projects. An expert system is necessary that incorporates the intuition, experience, and rules of thumb that estimators use.

Skitmore found that practitioners with the greatest expertise in cost estimating were more concerned with maintaining familiarity with the market and overall price levels than with collecting and carefully analyzing project information. This finding was supported by tests Skitmore conducted on bidding accuracy of quantity surveyors. Those who did best in the tests were equally good when a little or a lot of predesign project information (taken from completed projects) was made available.

In *Automated Architectural Detailing: A Knowledge-Based Approach,* Australians Antony D. Radford and John R. Mitchell describe their ideal of a knowledge-base-driven software program capable of automatically producing standard details. They contend that standard details in books usually present all the information necessary for construction, but not in a way that explains the logic behind the details. Such an approach assumes the architect user will already appreciate the design decision-making logic and will know how to alter the standard details accordingly. In practice, it is often those who do not understand the logic who turn to books of standard detail, rendering such books less than effective, the authors reason.

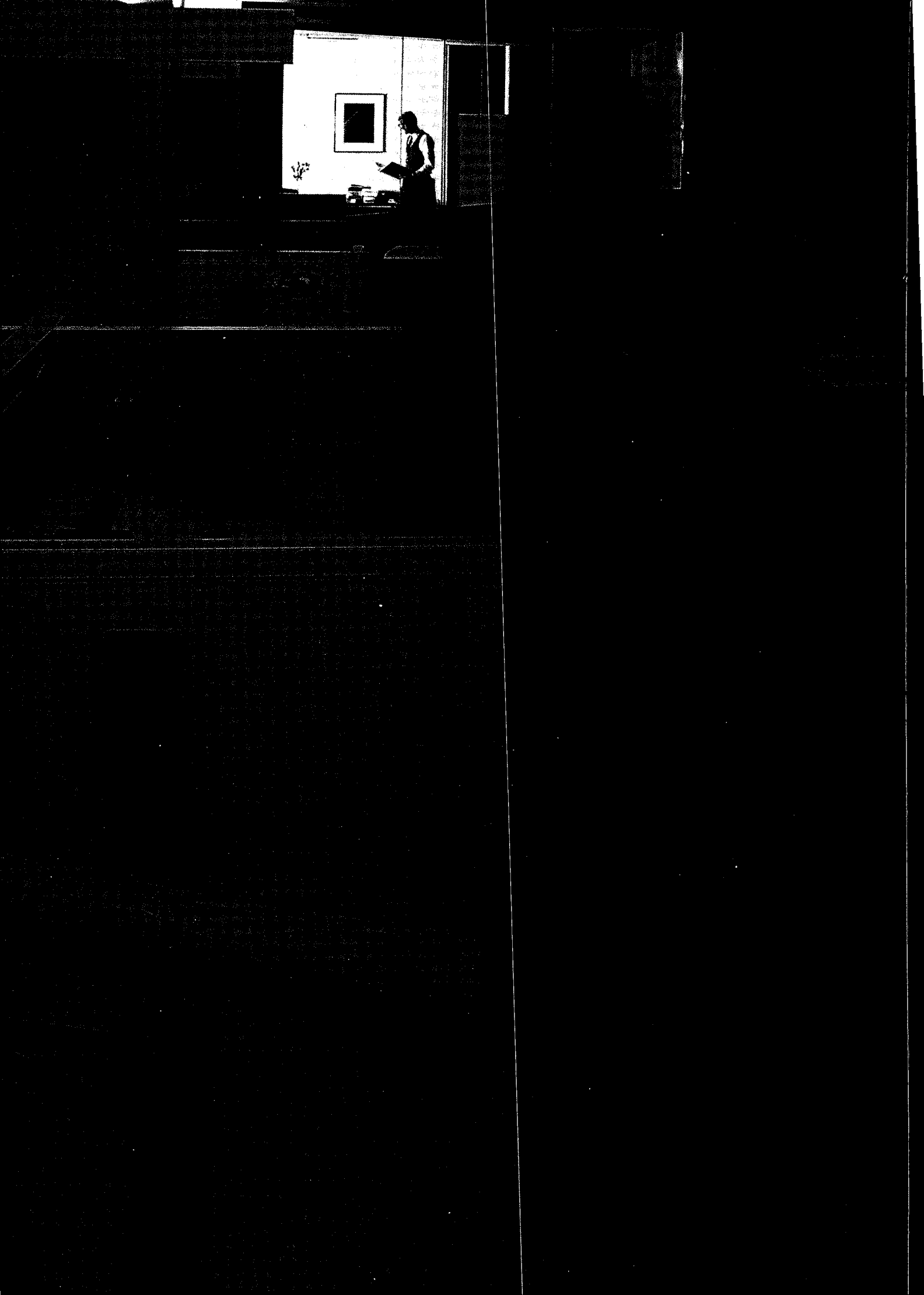
CADD systems so far have not done much better. Data bases of design details are available and may be modified by the user. But even though the data bases may be much larger and the automated retrieval process more exacting than is possible in a book, the standard details must be modified manually. The knowledge-based designing system goes a step further by automating the generation of a detailed design from the architect's CADD-generated design.

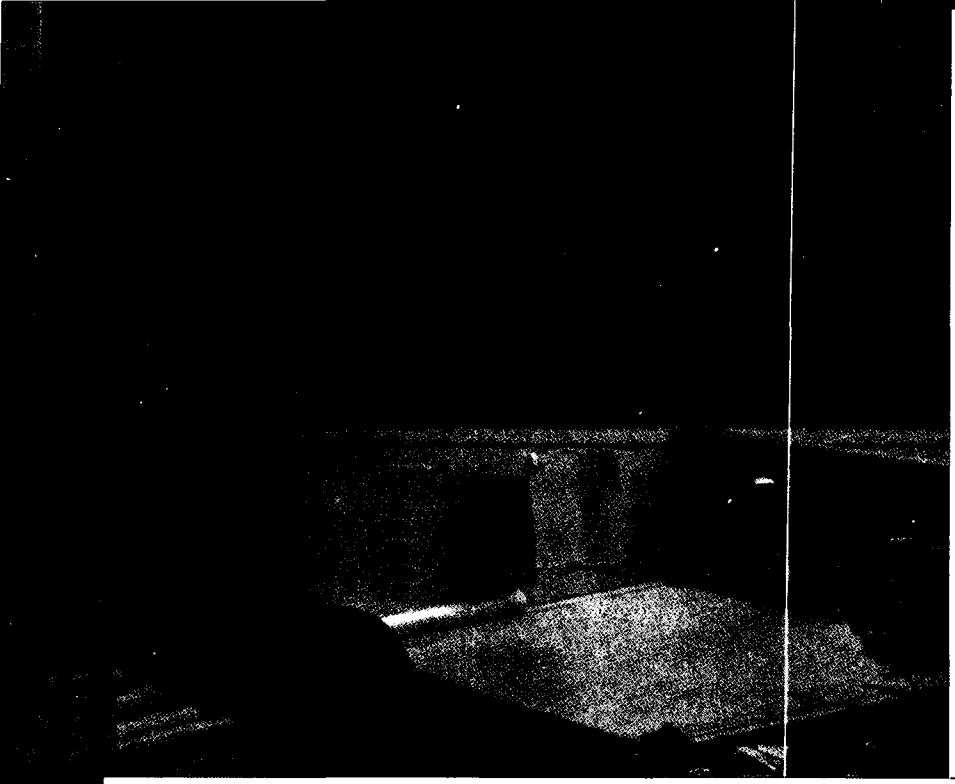
The model assumes that the problem of deciding on the final state for the design can be broken down into a series of linked subproblems, with the output from one stage becoming the input for the next. A sketch design generated by the architect presents a series of conditions that the software converts into detailed design consequences. Those consequences are themselves conditions for further computer processing to produce more refined consequences that again become conditions, and so forth.

Much like a knowledge-based system for standardized detailing, software that stores building code information is most useful when it contains the logic behind the code. In their paper *Formulation of Building Regulations Using Interactive Logic Programs,* David Stone and David A. Wilcox of the United Kingdom describe a logic program written with the language PROLOG, which lends itself to standards regulations.

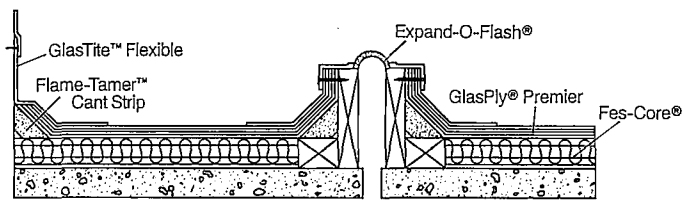
In PROLOG, logic is encapsulated as either facts or rules. A fact is a given value, such as occupant load. A rule is a single algorithm in a logic chain: "If X is the total width of the escape route to be approved, Y is the calculated total width of the designed escape route, and Z is the minimum total width of an escape route by code, then X is the greater of Y and Z." According to Stone and Wilcox, the computer program is successful if it is complete, produces only one opinion on compliance for each item in question, and is correct according to the intent of the software author. □

The International Council for Building Research, Studies, and Documentation 1986 congress proceedings were published by the National Bureau of Standards Center for Building Technology.

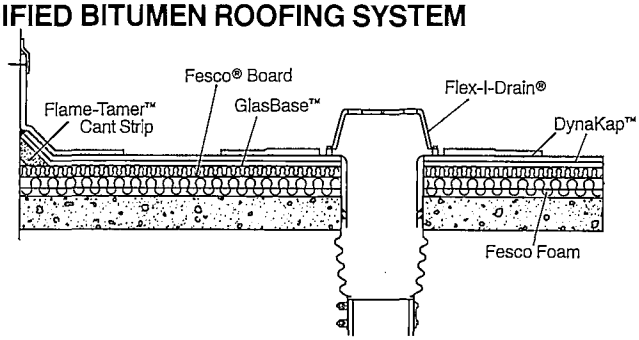




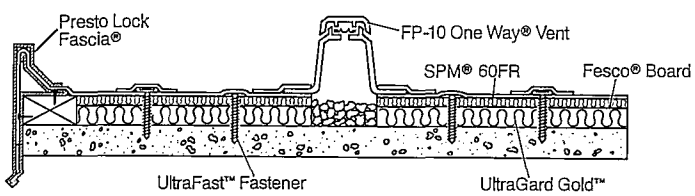
BUILT-UP ROOFING SYSTEM



MODIFIED BITUMEN ROOFING SYSTEM



SINGLE PLY ROOFING SYSTEM



Specify Manville.

You won't have to burn the midnight oil making roofing systems decisions.

Manville supplies all three major roofing systems: built-up, modified bitumen and single-ply.

That's why Manville can eliminate a lot of after-hours work for you in the selection, design and specifications stage of your project. Manville can offer you impartial, objective recommendations resulting in the best possible roof for your building design. And this means you'll receive Manville quality in every component in the roofing system, from the deck up. Including insulation, fasteners, accessories, and, of course, the membrane itself.

More than that, you can receive design and specification assistance from the industry's largest, most knowledgable staff of full-time roofing specialists. Experienced district engineers work with you on your project from start to finish, including inspections and on-site problem solving.

Manville gives you true single-source supply and backs it with single-source responsibility for the performance of the roofing system. Manville's unique guaranteed guarantee offers the roofing industry's broadest coverage.

Specify Manville and you'll save yourself a lot of time-consuming decision making. A helpful Manville roofing specialist is as close as your phone. Just call (303) 978-4900. For export, telex 454404 JOHNMANVL DVR.

21,000 people with one goal:
To be your best supplier.

Manville

Circle 34 on information card

Space Frames, Outer and Inner Space

New prototypes and new ways of thinking. By Forrest Wilson

The structural strength, design flexibility, and ease of assembly inherent in space frames make them the structural system of choice for extraterrestrial habitat prototypes. Because today's spartan space-flight accommodations, accepted by highly trained and motivated astronauts, will not likely be acceptable to space travelers in the next decade, space frames are being developed with a view toward comfortable long-term environments. Researchers are thinking about designing "livability" into space stations for civilian crews, about the quality that space frames impart to the interior design of compact living spaces, and, finally, about the architect's role in space station design.

Our initial space colonies will be pieced together in low earth orbit from materials lifted from the earth at an estimated cost of $1,000 per kilogram. The current space shuttle, when operable, could put about 30 tons of cargo into a 200-nautical-mile circular orbit.

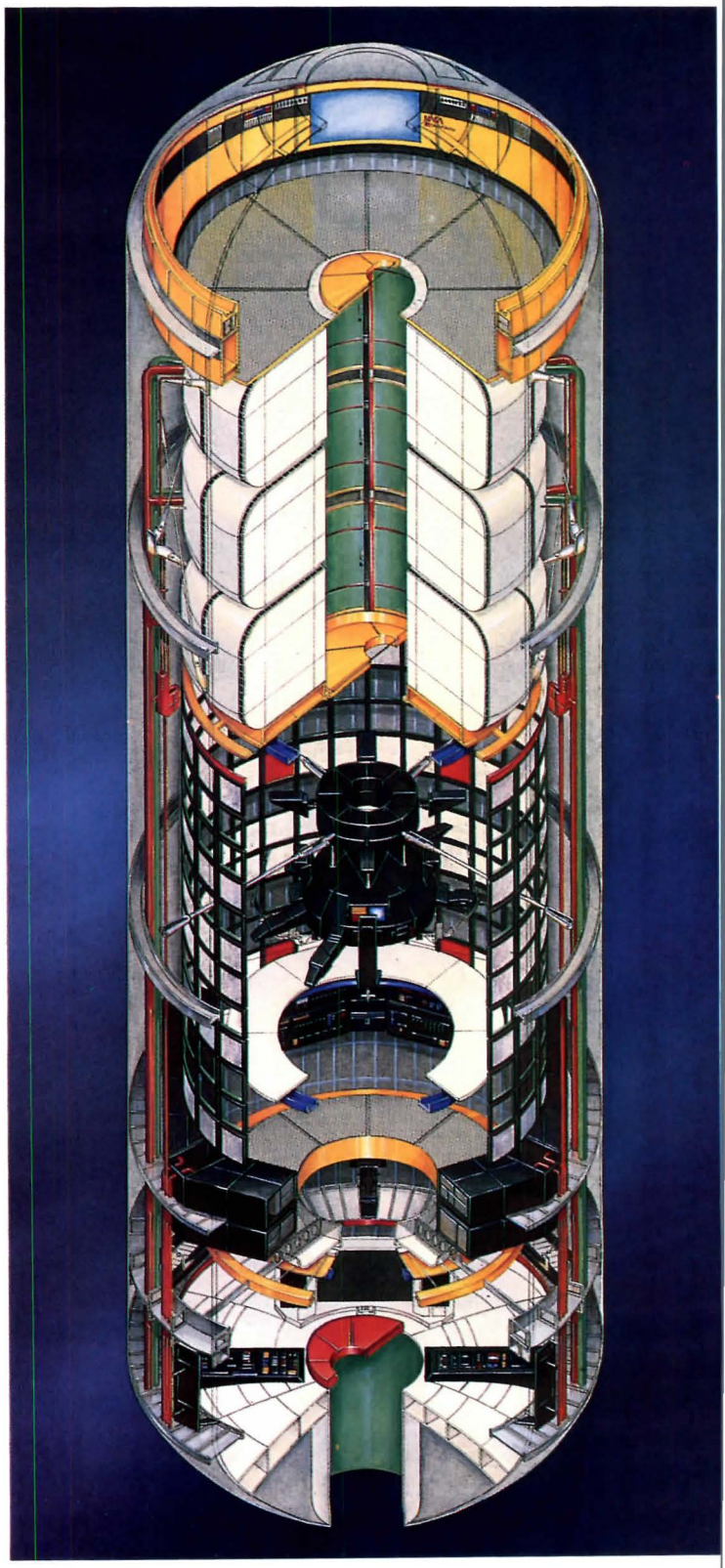
A proposed design by Stuart Grinstain, AIA, of the Urban Innovations Group uses multiple external fuel tanks to form an orbiting space station. The external tanks first power a space shuttle, which in normal flight attains 98 percent of orbital insertion velocity. The tanks must remain attached to the shuttle's orbiter until low earth orbit is reached. Then, by combining the tanks with other station components on a space frame platform, usable interior volumes will be made available.

Grinstain's design, attached to a "Star Net" armature (see Aug., page 82) offers us a glimpse of how space stations might be constructed and indicates that it is time to ponder the livability of space stations. The interior architecture of the space stations, especially the habitation modules, maximizes the livability of interior space by increasing its apparent size and providing sensory stimuli, spatial variety, and kinesthetic involvement. Space stations offer an array of new design parameters, as illustrated in the following examples.

Gravity, or the lack thereof, is one of the major design issues of inner space in outer space. In the world of zero gravity, up and down have little meaning—ceilings, walls, and floors are interchangeable and all can be used as work surfaces. People can move about freely with no need for stairs. But to perform stationary tasks, workers need some means to anchor themselves in place.

Conventional furniture is of little use without gravity to hold the body in a bent, seated position. One can sit in space only by continuously tensing the stomach muscles. Beds are not required because sleeping bags can be attached to walls or ceilings. Smaller items float, get lost, or get in the way if they are not fastened down. Even a simple glass of water must be contained, protected, and restrained—the volume consumed and accounted for, and unused portions disposed of or reclaimed. Drinking a glass of water, or, for that matter, using a toilet—casual acts in our one-g society—become major design challenges in space.

Dining in space is important physically and psychologically. Meals for a large crew pose problems of bulk storage and preparation. And the need for satisfying food is at least as important for emotional health as for nutrition.



Designing against boredom and related stress is another challenge. Studies of submarine crews indicate that they become bored during extended terms in isolation. Reducing tensions among individuals living in close quarters with limited privacy is essential. Skylab astronauts required extensive exercise to compensate for the lack of gravity. Some had trouble holding food; others could not sleep because of spacecraft noises. Especially if jobs are routine, the crew will place high value on off-duty physical fitness, recreation, social interaction, and self-improvement. Design configurations that separate work areas from off-duty areas are indicated.

Grooming facilities may be significant specialized areas in the space station because good grooming is important for maintaining crew morale and mutual acceptance, especially on long flights. And, although lack of privacy can be tolerated for short periods, demands for privacy increase with the time in orbit. Private places where crew members can retreat for relaxation, solitude, and contemplation appear to be a necessity.

Biosphere II—simulating space on earth

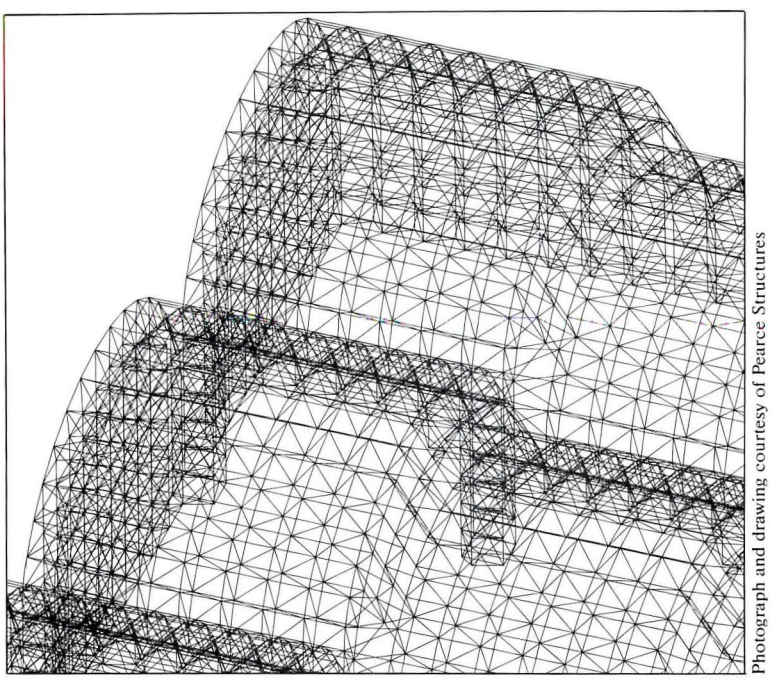
A sprawling 2.25-acre space frame is now under construction in the Santa Catalina mountains on the edge of the Sonora Desert just north of Tucson, Ariz. It will hermetically seal in, by means of a glazed space frame, an earth microcosm of miniature rivers, grasslands, forests, deserts, ocean, and a human population of eight for a two-year stay.

An 18,000-cubic-foot module of this project was erected to test materials, glazing techniques, louvers, heating/cooling, and computer systems in a series of experiments intended to continue over a 100-year period. Regulating air flow and sealing a structure of this size are considerable accomplishments. Glass louvers are operated manually and by computer to help regulate temperature, which otherwise could reach 156 degrees Fahrenheit. Fans blow air over cooling coils to reduce temperatures.

The test module will house a model "lung" able to expand or contract in response to shifts in atmospheric pressure. Without it the glass skin of the building could rupture. The lung ensures air will flow out rather than in should leaks occur, and it also equalizes internal and external pressures to prevent the sun-warmed air inside from popping the space frame glazing. But the integrity of the hermetic glazing faces other not so obvious threats: it was discovered that some varieties of termites will eat glazing sealants.

The project, called Biosphere II (the earth is Biosphere I) is being built by Space Biospheres Ventures with the University of Arizona's Environmental Research Lab as consultant. Sarbid Inc. is the project architect, and Pearce Structures is providing design, engineering, manufacturing, and erection of the space frame structure. "Biosphere II is intrinsically interesting because the space frame is the entire structure, not a secondary or peripheral part," says Peter Pearce, president of Pearce Structures. "The closure of the structure is an unresolved problem. We think we have solved it with a unique, integral glazing system." The design and engineering phase is complete and Pearce is now manufacturing components.

Left, Stuart Grinstain's design and specifications for fuel tank space station module. Top, Pearce Structures' 18,000-cubic-foot space frame test module for Biosphere II. Above, computer drawing detail of projected 2.25-acre hermetically sealed space frame.



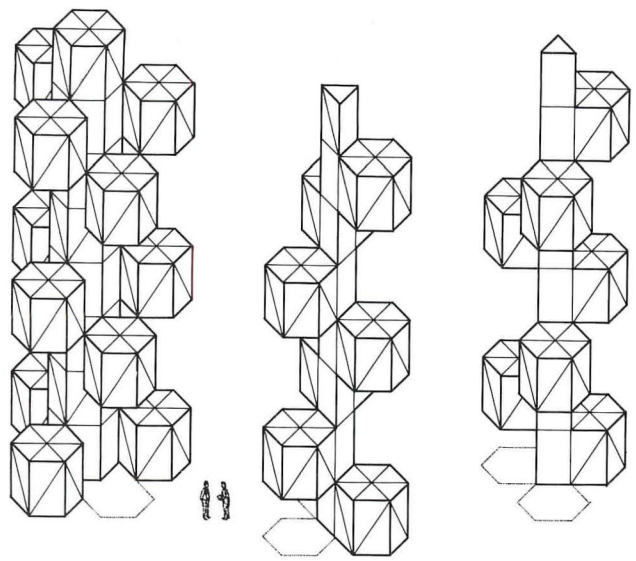
Photograph and drawing courtesy of Pearce Structures

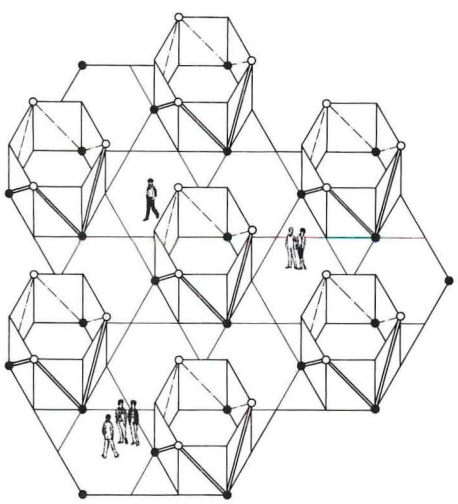
The space within—a guided tour

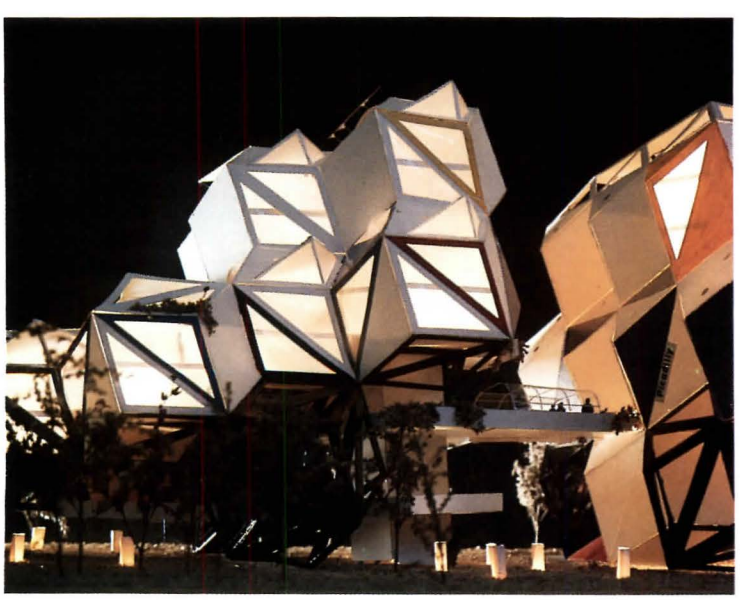
The space frame can separate interior from exterior space. Space frames form Biosphere II, serve as an armature for space capsules, and create livable interior spaces within themselves. What are the architectural principles the designer can use as a guide for interiors defined by space frames?

Professor J. Francois Gabriel of Syracuse University, N.Y., has conducted extensive research on the subject. According to Gabriel, if the space frame's interior space is high enough for a person to feel comfortable standing erect, it is considered habitable. The critical distance is approximately 13 feet. The space frame's diagonals organize space between upper and lower chords into contiguous spatial units of identical shape and size. They limit access to three locations where head room allows individual movement in and out. However, the repetition of identical rooms can hardly be called functionally, emotionally, or esthetically satisfying, Gabriel admits. Spatial variety requires finding diagonals that can be eliminated. Numerous studies indicate that buildings of any size and for any use can be generated from a six-directional space lattice. Gabriel proposes four such matrices:

- Certain semiregular polyhedrons—the cuboctahedron, the truncated octahedron, and the truncated tetrahedron—provide







Drawings and photograph courtesy of Francois Gabriel

Space frame research by Francois Gabriel of Syracuse University explores the spatial relationships of hexamods (basic building blocks). Above, photo study model of polyhedrons on edge.

the space variety demanded by architectural programs. These forms can be obtained from a compact aggregation of octahedrons and tetrahedrons. Their properties are shared by the six-directional space lattice, which is congruent with the cuboctahedron, the truncated octahedron, and the truncated tetrahedron. All the edges of the semiregular polyhedrons coincide with members of the six-directional space lattice.

Elimination of all members located within one family of polyhedrons will not affect the rigidity of the multilayer space frame and will open large spaces at regular intervals.

- A matrix consisting of a framework of identical sections of space trusses allows design of buildings relatively independent of the structural framework, which can be designed up to seven stories high in the intervals. Buildings could be integrated in the space-truss framework by a three-dimensional network of cables or space net. The diagonals of the space trusses can be continued by cables across the intervals, but chords would be modified. Instead of following the triangular grid found on the chords of space trusses, they would follow the triangular grid generated by the hexagonal spatial units. All vertical panels added to diagonals would then rest directly on a horizontal member of the new chord.
- Chords, modified as in the second matrix, but with rigid members substituted for cables, form a matrix that Gabriel has named "star beam." Chord members are doubled to form a three-dimensional floor structure. The replacement of two-dimensional chords with three-dimensional makes possible larger spans and eliminates some diagonals.

The star beam therefore is a tubular truss with considerable spanning capabilities. The basic spatial unit is space in a subassembly three times greater than one hexagonal spatial unit. It measures eight meters (about 26 feet) across, and the two bays that open into other units on opposite sides would be four meters (about 13 feet) wide.

- A compact aggregation of tetrahedrons and octahedrons forms the fourth matrix. All triangles are simultaneously the face of an octahedron and that of a tetrahedron. All edges, corresponding to individual members in a space frame, are shared by two tetrahedrons and two octahedrons. All nodes are common to six octahedrons and eight tetrahedrons.

It is possible to eliminate all but one set of octahedrons sharing a node between each pair and still retain a space lattice, defined as an array of straight lines always meeting under the same conditions.

Every story consists of freestanding octahedrons, providing a habitable space within itself and structural continuity from one chord to the next. The lateral distance between two is four meters, and the space surrounding them is continuous.

A space is connected to three others underneath and three above; vertical loads are transmitted directly from one to the other. The chords, which are the same as in the star beam, are rigid and ensure lateral stability.

The space is the basic building block of the system. The only additional component necessary to complete the entire structural inventory is another hexagonal subassembly similar to those used in the modified octahedron. One unit would normally be assembled on the ground and lifted into place, but each unit could also be factory assembled.

The four matrices are distinct and their distinguishing characteristics differ: the first makes use of relatively simple polyhedrons; the second consists of a permanent structural framework within which a secondary, adaptable architectural framework

is suspended; the third, the star beam, combines the simplicity of its components with a richness of possible combinations; and the fourth system can be either mass-produced in a factory or assembled on site by semiskilled workers. The four matrices differ in the size of the building projects to which they could be applied, but they all have enough in common to be compatible with each other. Only when they come to be used in a comprehensive manner, that is, to make architecture, will the potential of space frames be fully realized, Gabriel concludes.

Creation of a human environment

Examples such as these raise the tantalizing question of the role architects will play in the design of space structures.

According to Ron Keenberg, a professor at the University of Manitoba's school of architecture, the answer is clear. "Architects are not equipped to deal with the details of outer space design; that is the realm of space engineers," he says. "What architects can do, and do well, is create human environment."

Keenberg's fifth-year, master's-candidate students proved him right with a project of a manufacturing space station. Students worked for three months on the project as a team of nine, in units of three, and individually.

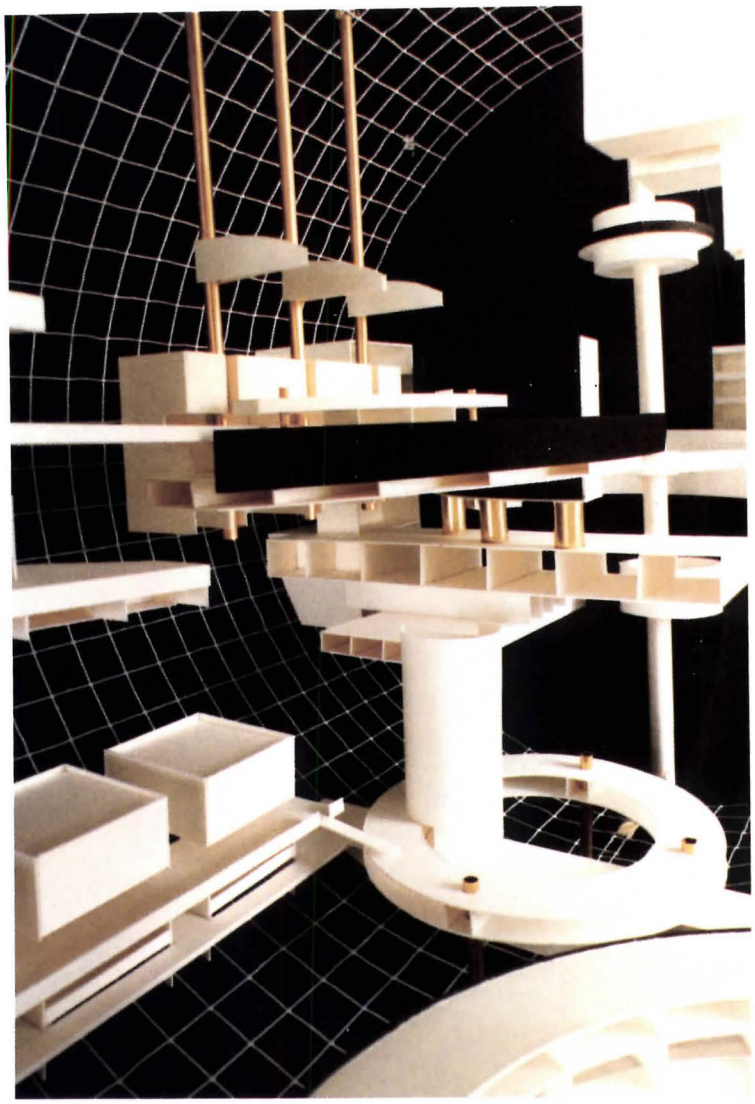
The program assigned to the students was less than one page long—they were to create the environment for a space station to manufacture "foamed steel" in zero or near-zero gravity. The foamed steel would have the same modulus of elasticity as earthbound steel, yet would be 1 one-hundredth of the weight. Ore would be imported from the nearby moon. The space station would support 3,500 people (3,000 adults and 500 children) who had volunteered for a five-year hitch with the theoretical sponsor, U.S. Steel.

U.S. Steel mandated only that the designers create an atmosphere of "happiness and increased productivity" for the workers. There was to be no formal political or law-and-order system in the station; troublemakers were to be sent back to earth with the nearest passing shuttle. With this mandate, students were forced to consider the political and communal ramifications of 3,500 people living together.

"Students were, in effect, given a clean slate upon which to create an environment," says Keenberg. "Many space station designs begin with a 'submarine mentality.' I asked students to go beyond. In three months, the students were required to formulate a design idea for a total emotional and societal environment to present to the theoretical client. To foster this kind of thinking, they were allowed to present only in perspective drawings and models."

Keenberg asserts that the students made a valiant attempt, and he and the guest jurors (Edward Jones, British architect and designer of the Missasaqua City Hall; Val Rynnimeri, architect and instructor at the University of Waterloo; and Forrest Wilson, professor of architecture at the Catholic University of America) were surprised at how much the students harked back to a utopian town-like environment. "I found it interesting that the students went back to 1920s utopian values in designing a system for the future," Keenberg says. "They became quite engrossed in studying different value systems, from Fascism to Marxism. How not to have U.S. Steel become 'Big Brother' became a paramount design issue."

Students also faced a very basic examination of the nature of structures in zero-gravity space. Onto an earth-manufactured



Study of facilities for the manufacture of foamed steel in space by fifth-year M. Arch. students, University of Manitoba.

platform would be attached a core structure built of the foamed steel. Because there would be no gravity, and therefore no wind load, the interior atmosphere for sustaining the inhabitants would push out on the structure, as if it were a blown-up balloon. Therefore, cylinders and spheres seemed to be the optimum shape, and the space station was designed as an extruded foamed-steel cylinder with a 100-meter diameter (which might be reduced in future refinements). It was composed of two pods—the central manufacturing pod at zero gravity, and the community pod, which would derive its earth-like gravity from revolution around the central area.

"The most difficult concept for the students to grasp was the idea of designing for reasonable, as opposed to 'dumb' [automatic] functions," says Keenberg. "Before you do anything, you have to have a design idea. The action of building is defined by its purpose and marred by the designer's preconceived attitudes.

"As space station designers, the students had to throw away their preconceptual attitudes about design, because they had no context to which to relate their design. They were to create a human environment to foster happiness, which is what an architect is supposed to do." □

AMP'S GOT A DIST
FOR ALL YOUR NET

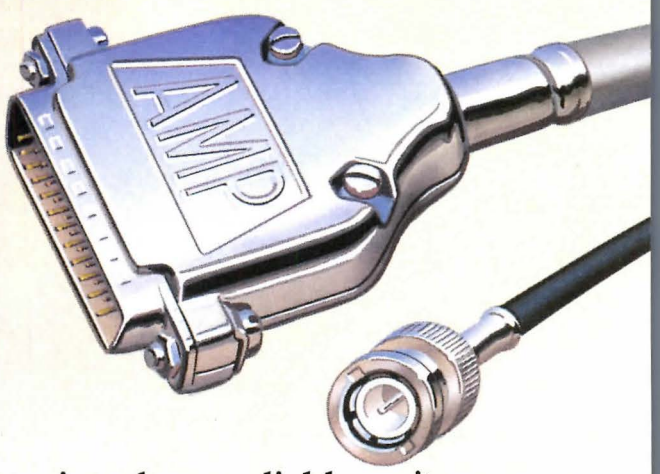
It's the AMP NETCON Distributor network. National in scope. One is near you.

Your local AMP NETCON Distributor has access to one of the broadest ranges of networking electronic interconnecting devices and horizontal distribution systems available anywhere.

They include undercarpet wiring systems for power, phone, data and image; AMP coax cabling; our family of AMPLIMITE RS 232 connectors; AMP modular products; fiber optic connectors and cable; AMPIX wiring closet systems; and AMP CHAMP connectors.

AMP connectors, fittings and networking accessories are the most respected in the industry. That's because AMP is the world leader in interconnection technology. And a lot of attention to design and quality control in manufacturing assures you of reliability in every product. That's why OEMs use more AMP connectors than any other brand, worldwide.

But your AMP NETCON Distributor is good for a lot more than just quality products. You can get technical help, comprehensive installation guides and detailed product manuals. Contact him the next time you need a networking product. Remember, a network

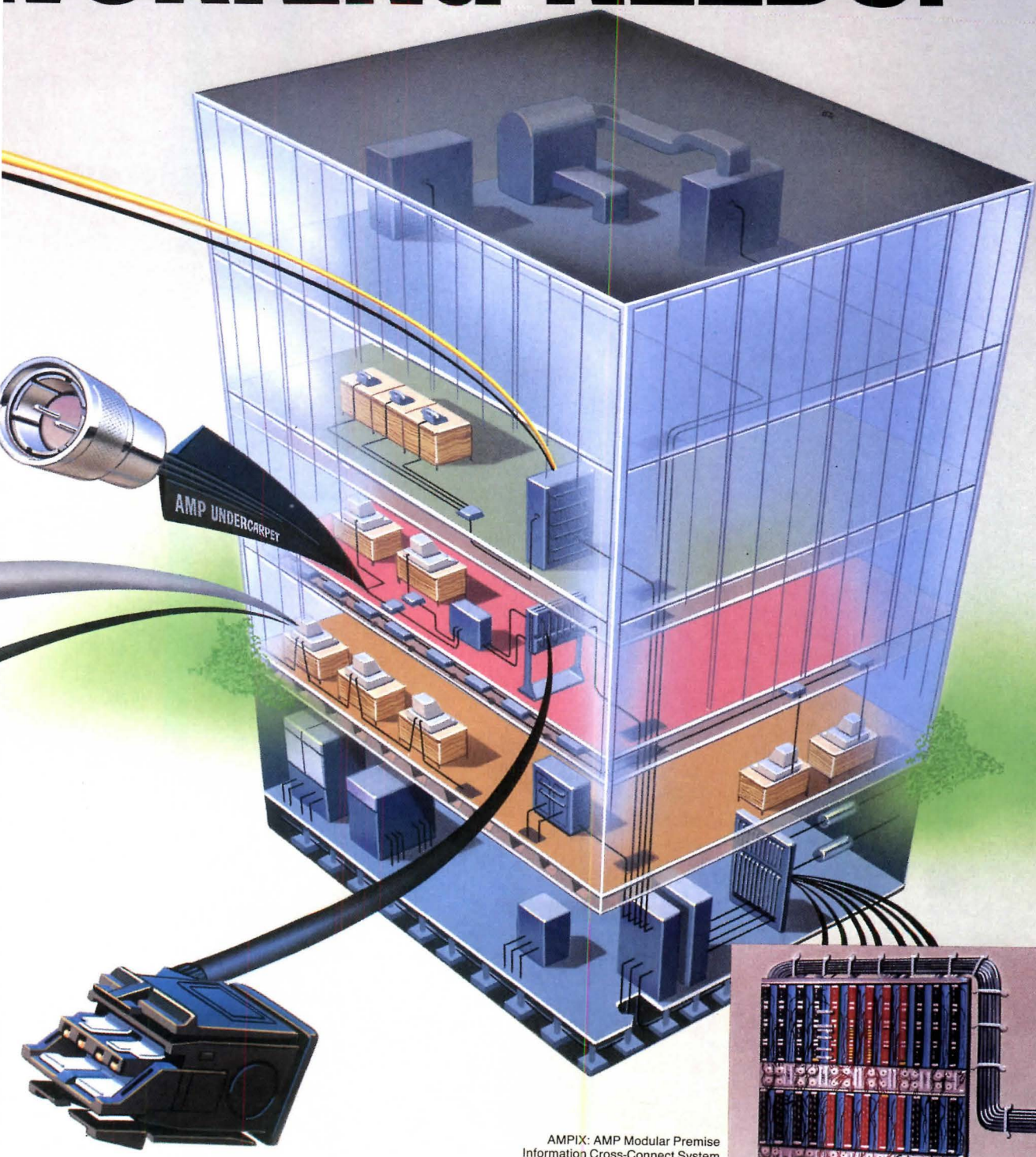


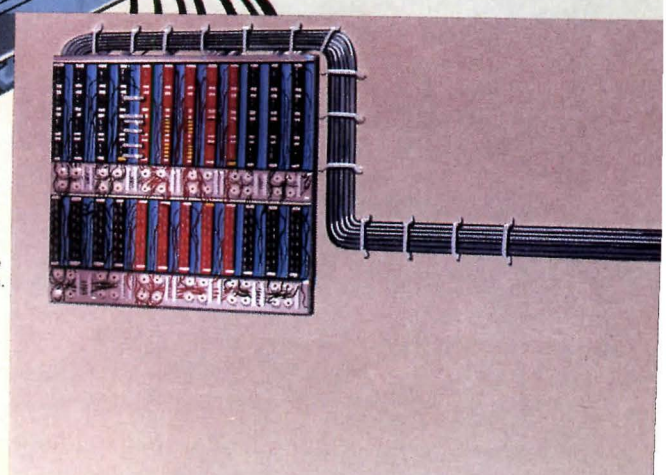
is only as reliable as its components. And you can't go wrong with AMP. **Call toll-free, 1-800-535-3232, Ext. 525.**

AMPNETCON
INTERCONNECTIONS FOR THE NETWORKING INDUSTRY
Division of AMP Products Corporation, Valley Forge, PA 19482

Circle 35 on information card

RIBUTOR NETWORK
WORKING NEEDS.





AMPIX: AMP Modular Premise
Information Cross-Connect System.

Roofing That Responds To Specific Climatic Conditions

By Elena Marcheso Moreno

The wind might huff and it might puff but it shouldn't blow your roof down. Not if local wind loads were taken into account when it was designed. And wind loading is just one factor that must be addressed for roof design on a regional basis.

Roofing for regional conditions is not necessarily a matter of one system working only in one location, but rather a matter of small changes in techniques or detailing for a particular area. Essentially, any well-constructed roof system will work in every region and no evidence exists that one significantly outperforms the others. Ultimately, the designer bases the choice of roof assembly on price, but by paying attention to regional considerations the designer can make any roofing system perform better.

Every location demands wind and moisture control. Wind flow over a steep roof can create a potentially damaging suction effect as high-velocity air travels over the ridge, away from the building, then back against it and down the leeward side of the roof. Long, low-slope roofs are also susceptible to suction at or near windward corners when the wind hits the eaves at an angle. Parapets can prevent wind suction by lifting the airflow high enough that it cannot flow back to the roof. But if parapets are not high enough, they could create even greater suction and in high winds might cause a roof to fail.

Flat roofs have other problems. Inverted roof membrane assemblies, in which the insulation is installed above the roof membrane to protect it from temperature extremes, may experience uplift of the insulation and the membrane itself even in moderately high winds. Substantially more strapping, tying, and ballasting than are called for in many codes or installation specifications are required to counteract wind uplift effects. For example, a typical requirement for commercial roofing specifies 10 pounds of ballast per 100 square feet of roof area. But gravel ballast often is weighed and delivered to the site wet, and its dry weight can be quite a bit less. A possible solution for avoiding a blowoff is to specify 20 pounds of ballast per 100 square feet for the roof perimeter area and 10 pounds per 100 square feet in the central part.

In regions known for very high winds, alternatives to ballast should be considered—the membrane could be adhered directly to the deck or a bitumen-type roof could be used. Secure perimeter attachment is the key to preventing a blown-off roof. Wood nailers need to be properly installed and all sheet edges should have continuous cleats.

Moisture concentration in roofing materials can be a problem in almost every climate. Vapor barriers are crucial to moisture protection, and how they are installed depends on climate. As a general rule, a vapor barrier should be installed where the average, ambient January temperature is below 40 degrees Fahrenheit, or where the relative humidity indoors is greater than 45 percent. Hot, humid climates also call for vapor barriers, but the method for placement in the roof is somewhat different from that in cold regions. Vapor retarders should be on the warm side of the roof assembly, and in hot, humid regions that means near the exterior.

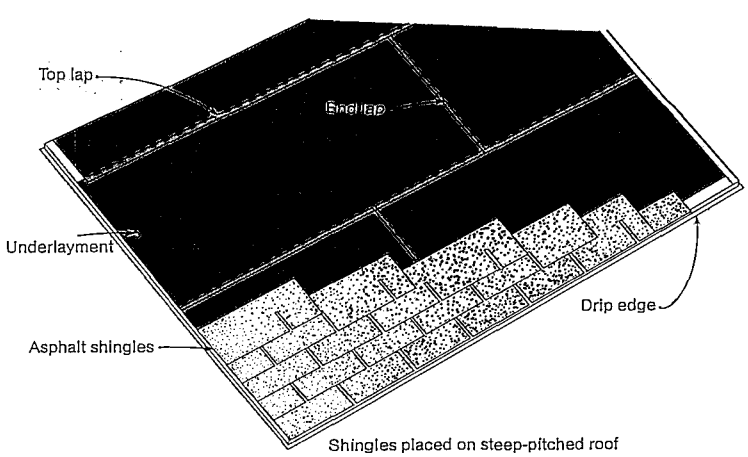
In single-ply roofing membranes, the membrane itself acts to retard vapor movement. In built-up commercial roofing systems, the bituminous layer acts as the vapor retarder.

Roofing for ice and snow

With the substantial snow loads typical of most cold areas in the United States, pitched roofs often make the most sense for residential applications. Less snow is likely to pile up on a steep roof, and the snow that does accumulate slides off quickly as it begins to melt. A pitched roof also readily drains itself, providing little opportunity for water to penetrate the roofing material. And the roof can be covered with shingles or tile, allowing flexibility without failure under thermal expansion and contraction of the roof structure. Shingles also permit interior water vapor to vent through their loose joints.

The flat roofs typical of most commercial construction, however, do not easily drain themselves and, to perform well, require more care during design and installation in cold northern locations than in warmer ones.

According to Neil Hutcheon and Gustav Handegord in their book *Building Science for a Cold Climate,* buildings operated under negative pressure in cold weather will not be subject to



Shingles placed on steep-pitched roof

condensation due to air leakage. On the other hand, pressurized buildings will experience increased air leakage and condensation if they have any moisture gains or are humidified. All tall buildings experience strong pressure differences in winter that produce outward airflow as a result of stack action. Pressurizing roof spaces is one way to prevent condensation from air leakage in flat roofs, but it requires continuous operation of fans.

Attic ventilation can prevent moisture from attacking roofing materials by removing vapor before condensation can cause trouble. Cold weather ventilation can prevent freeze-thaw cycles and their associated problems. A common standard for venting attics is one square foot of unobstructed ventilating area for every 150 square feet of attic floor space. Louvers and screens can reduce the venting area. Continuous soffit and ridge vents are recommended by some industry experts as the best solution.

Ventilation of attic spaces under sloped roofs, combined with ceiling insulation, can be very effective in preventing ice dams. Ice dams, which develop when water from melting snow comes in contact with a colder surface, can cause water to back up until it leaks through the roof. In commercial buildings, ice dams can be prevented by keeping the runoff areas of drainage systems away from sources of heat such as exterior lights.

All standards recommend high levels of insulation for cold-climate roofs. It is important to design the system so that the insulation never reaches the dew point. Insulation should not be applied directly over an existing roof and then covered with shingles, because the system cannot be properly vented, extreme heat buildup under the shingles will accelerate weathering, and insulation does not hold nails well enough to ensure that the shingles are securely attached.

Fred Stitt, editor of "The Guidelines Letter," maintains that relying only on building code standards can cause roof failures in cold areas. He says that doubling minimum square-inch requirements for roof drains and leaders, and sloping flat roofs to an absolute minimum of one-quarter inch per linear foot, effectively doubles the water protection of the roof for very little cost. In addition, he recommends increasing the number of drains by about 50 percent above guidelines to account for actual rainwater runoff. On roofs with potentially heavy snow loads, snow catching obstructions, or long spans, snow loading allowances should be doubled, according to Stitt.

Radiant barriers in hot, humid climates

Insulation techniques for hot, humid regions vary considerably from those in climates dominated by heating loads. In hot, humid climates, radiant barriers can significantly impede solar-driven heat gains in buildings. In a typical radiant barrier system, a layer of foil tops an air space in an attic. Radiant barriers block 95 percent of the radiant heat that enters a roof before it can reach the insulation and be transferred through the ceilings.

The best place for a radiant barrier is between the hot roof deck and the attic space along the bottom chord. Roofs with their structure exposed to the living spaces require a vent skin roof construction—two separate sheathing layers bounding an air space vented with ambient air.

For flat roofs, the Florida Solar Energy Center (FSEC) suggests an alternative system that places the ceiling plenum inside the conditioned space, greatly reducing duct losses. With a continuous vapor barrier below the bar joists, the ceiling plenum acts as a common return system. The space above the rigid insulation can be ventilated for both thermal and moisture control. FSEC says such a radiant barrier roof system can provide considerable energy savings in single-story commercial buildings where space conditioning is required.

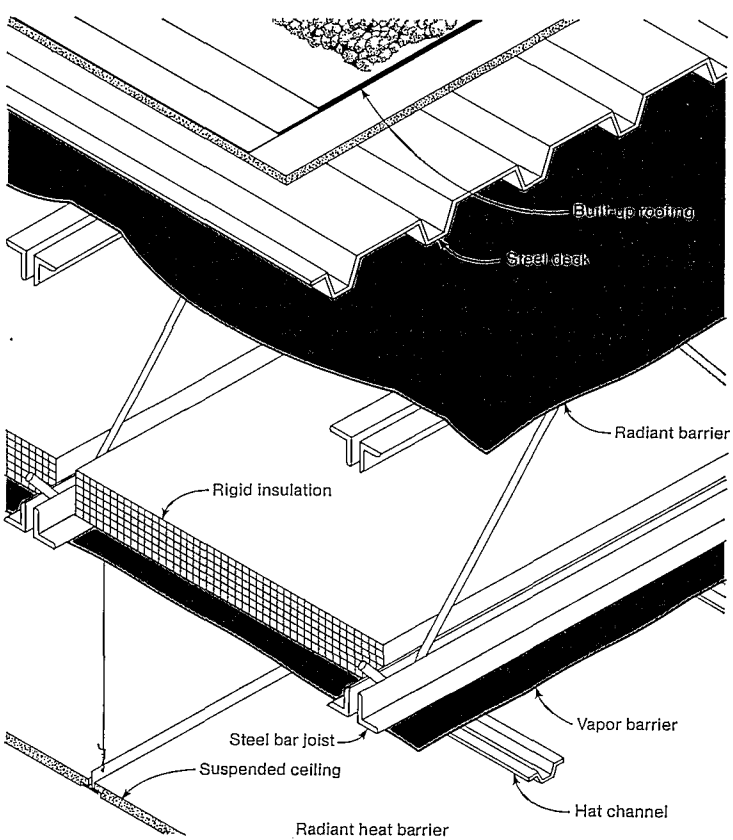
Roof color plays an important role in keeping building interior spaces cool in all hot climates. In the southern parts of the United States often very little insulation is used in roofing assemblies, and roofs frequently will absorb enough heat to affect interior temperatures. In response to the negative impact of too little insulation, the demand for reflective roofing is rising.

White and light colors are the most reflective of radiant heat. A roof can be made reflective by applying a white surfacing material or membrane. Light-colored roofs supposedly weather better than black roofs because they are not subject to extreme temperature fluctuations and they resist the damaging affects of ultraviolet radiation. There is, however, some criticism that the white chemicals substituted for carbon black in rubber membranes adversely affect strength, and that dust and dirt can reduce reflectance.

Black bituminous or EDPM systems can be made more refective as an alternative to using white membranes. Coatings and light-colored ballast add the same amount of heat and light resistance to dark roofs. However, ballast can move or thin out, leaving spots susceptible to heat and ultraviolet radiation damage.

Felts in built-up roofing respond to moisture in various ways, depending on composition. Organic felt roofing laminates expand rapidly in one direction when exposed to humidity. But glass fiber laminates basically maintain their original volume even under very wet conditions.

Although just about any correctly applied roofing system will work in any climate, reroofing an existing building is not always so foolproof. According to one manufacturer of single-ply roofing membranes, most of the membranes on the market are not well



suited to reroofing applications in hot, humid areas. The permeability of EDPM membranes increases with rising temperatures, which may create a problem when single-ply systems are installed over existing built-up roofs. As the temperature increases and single-ply systems become more permeable, moisture penetrates down into the BUR system and condenses between the two layers. A bituminous system therefore offers a better solution for reroofing in a hot, humid region.

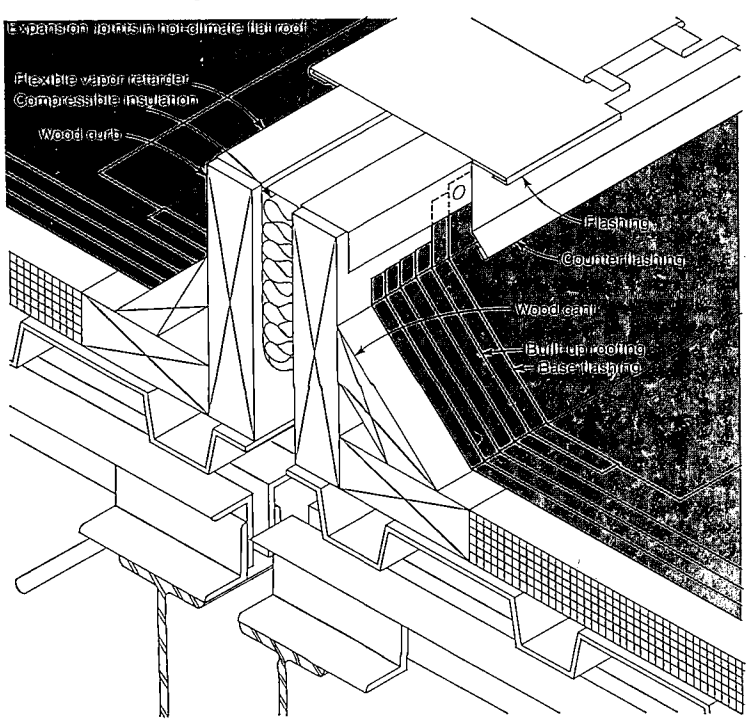
Such regions tend to be hurricane-prone, so wind loading is a major consideration. Loosely laid ballast is likely to fly in gusts that exceed overall wind speeds by up to 50 percent. Some municipalities will not allow the use of loose ballast and require all roof materials to be fully adhered or mechanically fastened. Florida has recently legislated the requirement that coastal buildings withstand wind loads up to 140 miles per hour.

Expansion joints in hot, dry areas

In areas such as the Southwest, where daily temperature swings are extreme, roof materials can degrade rapidly if care is not taken. To make matters worse, traditional regional architecture entails mostly flat roof construction, even for housing, so the entire roof is exposed to higher temperatures longer.

With extreme temperature changes come rapid expansion and contraction of a roof material, imparting thermal shock so great it could tear apart the membrane through ridging and splitting. In addition, the expanding membrane may be located over a substrate that expands and contracts itself. One solution is to detail a system with more expansion joints than typical. One guideline says that expansion joints should be placed every 150 to 200 feet in both directions. Other practitioners in the Southwest recommend expansion joints for at least every 3,000 square feet of roof area.

Expansion joints are also required at points where movement and stress will be concentrated. Stresses caused by vastly different coefficients of thermal expansion of two adjacent materials can cause the roofing membrane to crack or split. The same holds true where there is a change in decking direction, and at re-entry points in any but a rectangular configuration. Additionally, expansion joints should be provided at the connections to additions and (in hot, dry areas especially) where interiors with different temperatures adjoin, such as an airconditioned office adjacent to unconditioned warehouse space. Expansion joints must extend the entire width of a roof assembly, should rise about eight inches above the roof line, and should never be used for water drainage.



Materials with high tensile strength and a high modulus of elasticity find favor in hot regions. Modified bitumen, modified hot asphalt, and polyester felts all have high elasticity and load strain resistance, which give them the ability to resist cracking induced by expansion and contraction.

Although Southwestern cities get little precipitation—seven inches per year in Phoenix—it does rain, which means that roofs in hot, dry climates need to be as watertight as those in other climates. Waterproof membranes, ventilation to eliminate moisture, and adequate drainage must be provided.

In a region where outside temperatures can easily pass 100 degrees Fahrenheit, reflective roof coverings have a lot of appeal. Some owners have found their reflective roofs to cut air-conditioning expenses by 10 to 20 percent. Because white single-ply systems are relatively expensive, another popular means of achieving reflective roofing is to apply some sort of coating such as paint or mineral granules embedded in the sheet. White-coating a multi-ply system works well in hot, dry regions because the freeze-thaw problem that causes paints to deteriorate doesn't exist. In arid climates, painted roof coatings can remain intact for as long as 15 years, whereas in a harsher climate the projected lifetime of a painted coating is three to four years.

Temperate zone: everything in moderation

In temperate regions, roofing practice takes lessons from all the other regions but with a more modest approach. Insulation protects against winter heat losses and helps keep interiors cool in summer. As in cold climates, attic ventilation will prevent moisture damage in houses. Roof color can make a difference by reducing cooling loads, and radiant barriers in temperate-zone roofs might eliminate summertime cooling requirements.

For commercial building installations, ventilation might be the best approach to controlling moisture condensation on the cold side of low-sloped roofs. Stack, or relief, vents incorporated into roofs can effectively control moisture. As long as there are enough vents penetrating a low-sloped roof, heat from the building interior works together with outside air of low humidity to dry out damp insulation and other roofing materials in the winter.

Roof venting can be most effective when new roofing is installed over old insulation that contains some moisture. According to the National Roofing Contractors Association, a roof stack vent should be installed for every 1,000 square feet of roof area when a building is reroofed. These vents will dry out the roof and prevent pressure build-up that could cause blistering and cracking. The vents work best if they are of varying heights or run along an incline. Edge and side venting can also be used. □

Information was collected from a number of sources, primarily from Tom Ewing of Tremco, Steve Sears, AIA, of Kober/Sclater, Phil Fairey of Florida Solar Energy Center, and the National Roofing Contractors Association.

Marketing Lessons From Abroad

By Barry B. LaPatner, Esq.

In some countries, architects get the respect they deserve. For instance, an architect in Libya has the "power of a prince," according to Faisal Banani, formerly head of one of the largest architecture firms in Libya and now practicing in Washington, D.C.

"The architect is in control and supervises the project," says Banani. "If the contractor tries to intervene with the client, the client sends the contractor back to the architect. If a job has to be stopped, the architect sends a letter to the contractor and a copy to the client. The contractor either stops the job or the client intervenes."

But in this country, unfortunately, the public needs a little encouragement to appreciate the shapers of its built environment. We can take some hints from current practices in Europe.

In France, it is common for the owner of a building to have the name of the architect and the date of the building's erection carved into stone below the first story (our second floor). Hence, walking through a French city's streets, one frequently sees above eye level a notation such as, "M. Sancerre - Architecte 1885."

Many years ago, it was not uncommon for American builders to incorporate cornerstones on their buildings recording the name of the architect. For many reasons—but mostly due to architects' failure to request continuation of the tradition—this practice fell out of favor, and today few if any cornerstones with architects' names are seen on modern buildings.

AIA's newly revised owner/architect agreement B141 now states that "the owner shall provide professional credit for the architect on the construction sign and in the promotional materials for the project," but falls short of mentioning cornerstones. This shouldn't discourage architects from

Edgar Tafel, FAIA

When the contractor of the Guggenheim Museum asked Frank Lloyd Wright to include the name of his company on the cornerstone, Wright replied, 'A round building doesn't have a cornerstone. My name will be there as architect and yours as builder. (From the book Apprentice to Genius *by Edgar Tafel, FAIA.)*

vision in their own contracts.

In the simplified contracts LePatner, Gainen & Block use, a provision calls for the owner both to incorporate a cornerstone into the design and to provide a ceremony for the laying of the cornerstone. The novelty to the owner of having the opportunity to celebrate the construction of his or her building—with the attendant publicity welcomed by all owners—enables the architect to readily sell this concept as part of the contract.

But to return to the topic mentioned in reference to B141, architects in this country might take another lesson from their European counterparts. A recent tour of London disclosed an enormous burst of construction—both new and adaptive restoration—which has sheathed that city in labyrinthine layers of scaffolding. However, to the delight of a visitor who preaches the importance of quality promotion to stateside designers, there is, at each and every project site, discreet yet noticeable signage showing the name and address of the architect and consulting engineers as well as the contractor and any quantity surveyor (cost estimator) for the project. If the architect is a member of the Royal Institute of British Architects, the RIBA logo is shown next to the name.

There is a standard size of sign and lettering for these projects. All the signs are tasteful, slightly higher than eye level, and decorated with a shield or crest for local flavor.

How wonderful it could be to have AIA and NSPE adopt a uniform standard for signage, which could be incorporated onto every project's exterior. Allowing for the firm's logo beside its name, AIA's logo would add stature to the Institute's membership and would artfully enhance the reputation of the design team for a project.

No longer should the only signage at a project be that of the contractor, the foundation sub, or, at the conclusion of a project, the firm that polishes the metalwork. No longer should the architect or designer for a project pass up the opportunity to garner the credit during construction that such firms deserve. Why should two or three years of work on a project go unnoticed by the public for lack of attribution to the firm whose design has made it all possible?

So, in the final analysis, this article is a call to design professionals and their local, state, and national associations to unite in a cause that can only benefit their members—a cause that can enhance their stature and alert the public to the identity of the architect whose efforts will be embodied in the building or renovation under construction.

Experience shows that clients are receptive to the prestige that comes when their names appear with yours on the construction site and completed building. Robert Fox, AIA, principal of Fox & Fowle, New York City, says they have no trouble getting clients to accept a contractual clause calling for cornerstones and more.

"In New York the big ceremony is topping out, so we don't go as far as to have a cornerstone-laying ceremony," Fox says. "But our firm's name is displayed prominently at the construction site, on our clients' leasing brochures, and on cornerstones, all of which give the clients prestige in the eyes of their tenants and at the same time identify our work to the public." □

Barry B. LePatner is a partner in the New York City law firm of LePatner, Gainen & Block. He is a professional affiliate of the New York City Chapter of AIA.

Now you can play matchmaker with us and come up with wilder schemes than ever before. Because new Satinglo™ and our joint alignment system let you match up glazed and unglazed ceramic mosaics for a continuous sweep of color that flows across the floor and up the wall.

Go crazy with Amethyst. Splash Sea Mist around the room. Say it soft or turn it up with our 30 new colors. Tie it all together with our full line of ceramic mosaic trim for a unified look.

And while you're raving about the design possibilities, you won't be climbing the walls waiting for your order to come in. Our product is ready for immediate shipment.

Look at ceramic mosaics from the right angle and the choice is clear. American Olean.

We Turn Earth Into Atmosphere

American Olean Tile

A National Gypsum Company

Circle 38 on information card
For more information about new Satinglo and our other color coordinated ceramic mosaics, write American Olean Tile Company, 3413 Cannon Avenue, Lansdale, PA 19446-0271. Or call us at (215) 855-1111.

OUR MOSAICS V

Drawings and Specifications For Concrete Formwork

The keys to economy in concrete formwork design are regularity and uniformity in structural design. As early as possible in the design process, the architect and structural engineer should get together to evaluate structural alternatives, keeping in mind the need for continuous framing using uniform depths, widths, and floor-to-floor heights. Using rough preliminary design sizes, they can then establish the kinds of flooring systems appropriate to their design, and can locate columns, core elements, and shear walls.

After this, the contractor generally is responsible for the planning, design, and construction of the necessary formwork. Usually the specifications state minimum requirements for design, construction, placement, and stripping of the formwork, allowing the contractor considerable leeway to get the job done. The specifications, however, should also include clearly defined procedures for inspection and approvals of formwork before and during the pour, as well as when the forms can be stripped (in terms of strength of the concrete).

Specific items included in the plans and specifications will vary from job to job, but if the structure is particularly complicated or if the concrete requires a special architectural treatment, it is recommended that both the architect and the structural engineer work closely with the formwork designer. Regardless of the complexity of the job, the architect should provide a complete description of the structure in plan, section, and details, including all dimensions, centerlines, and locations of particular details.

Both the drawings and specifications should include tolerances in measurable terms. "If you don't show it, you don't get it," a contractor once told me. You also have to tell the contractor how thick, level, and plumb each element must be. This includes not just concrete surfaces but also expansion and construction joints, chamfers on beams and columns, and *all* openings.

Be sure to locate and detail all inserts, giving clear measurable tolerances. An insert improperly located or set so that the proper tolerance can't be achieved will cause headaches for the next construction trade to work on the project.

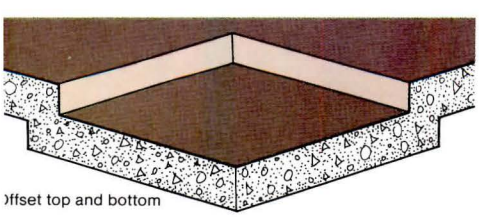
All live load information should be included in the specifications along with camber requirements. When post-tensioned members are used, explanations of load transfer during the tensioning may be necessary.

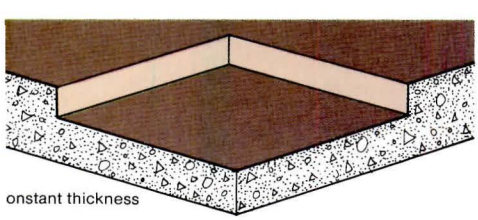
Include in the drawings the complete measurements and basic geometry for special structural shapes, and tie in those dimensions to the overall structural dimensions. It's embarrassing to have the contractor call, wanting to know where that beautiful detail is located "exactly." Also, detail and carefully locate on the plans (and elevations, if necessary) any areas of architectural concrete. The specifications should also require the contractor to construct a mock-up of any architectural concrete for the architect's approval.

Not all architects need be expert formwork planners/designers, but if they are willing to learn a few basic rules they may avoid future problems for themselves and costs to their clients. Ceco Corp., a major formwork supplier, and the Concrete Reinforcing Steel Institute, divide concrete design into two major "strategies"—horizontal and vertical. Included in the horizontal design strategy are floors, roofs, drops, joists, and beams. The vertical design strategy encompasses columns, pilasters, walls, footings, and brick ledges. After designing with the total building in mind, the architect and structural engineer can compartmentalize the building structure into horizontal and vertical components and analyze potential problems in the formwork.

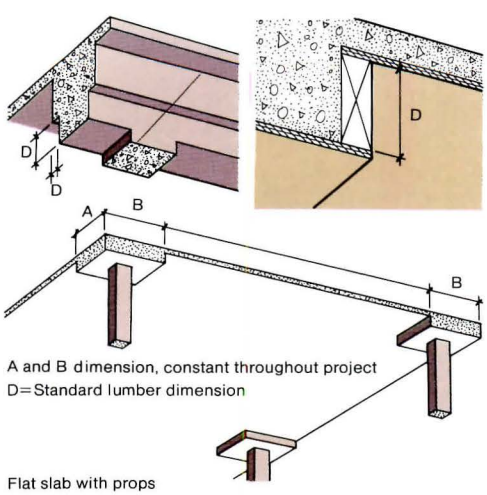
Horizontal elements

The greatest formwork costs are usually associated with the horizontal elements of the structure. The cost per square foot of any floor system is a function of bay size and load conditions. Once the loads have been determined and bay sizes worked out, a floor system can be selected (if all else is equal) based on which system will do the job for the lowest cost per square foot. For example, according to Ceco's data, when designing for a bay 15 feet square with a total load of 145 pounds per square foot, a flat plate slab is less expensive per square foot than a two-way joist system. If the bay size is increased to a little over 25 feet square, the two systems are equal in cost. But if

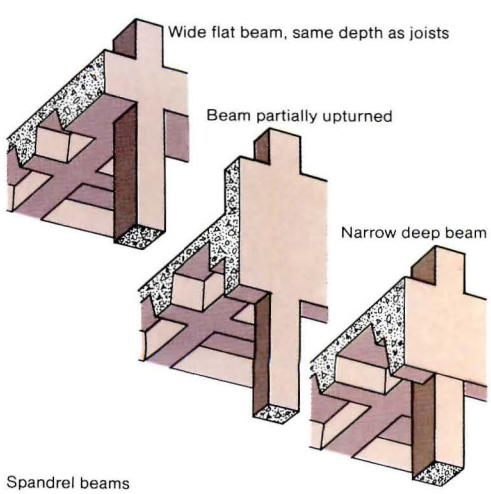




epressions in slab



Flat slab with props



Spandrel beams

the bay size is increased to 40 feet square, the flat plate slab is more expensive than the two-way joist floor.

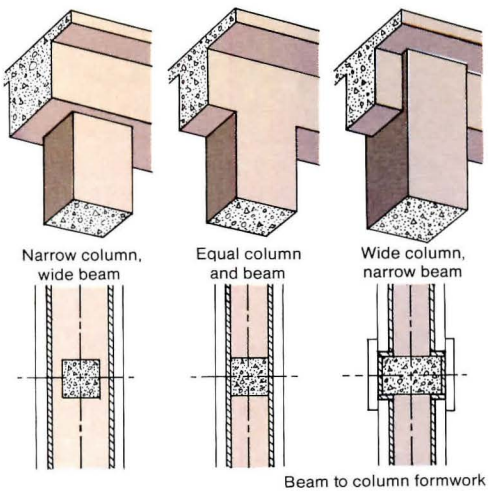
Other strategies suggested for design of horizontal elements include:

• Design for constant horizontal depth. If depressions in the floor slab are necessary for tile or terrazzo, only the top of the slab should vary, not the bottom. It's more economical to oversize the slab than form an offset on the bottom of the slab.

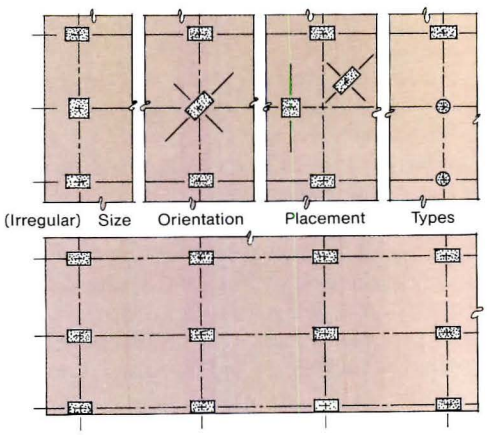
• Repetitive floor-to-floor heights reduce the number of adjustments to shoring, are more labor efficient, and are less costly.

• The Concrete Reinforcing Steel Institute suggests the designer consider shearhead reinforcing within the floor slab to eliminate the need for drops or capitals, which are expensive to form. If this isn't possible, keep the distance between drops a minimum of 16 feet 6 inches, to allow for the use of standard 16-foot lumber. Finally, keep the depth of the drop consistent throughout the building, using standard lumber dimensions as a design guide.

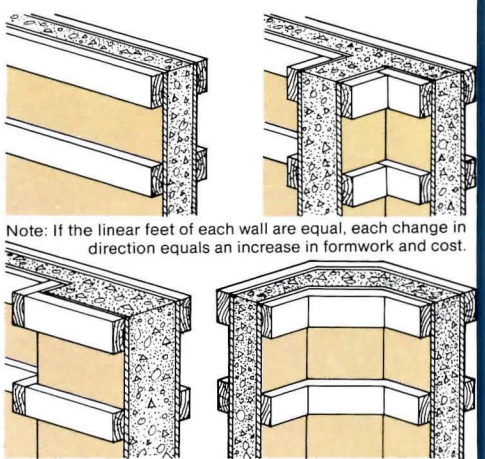
• Floor joist systems with beams the same depth as the joists allow the laying up of the formwork in one continuous horizontal plane. They also allow the use of



Beam to column formwork



Column layout


Note: If the linear feet of each wall are equal, each change in direction equals an increase in formwork and cost.
Wall formwork

flying forms, a relatively economical forming system.

• Wide, flat beams are generally less expensive to form than deep, narrow beams. If deep, narrow beams can't be avoided, design them to common lumber dimensions to avoid expensive carpentry. Whatever the beam size, maintain it consistently throughout the building.

• A rule of thumb is to keep the beams the same width as or wider than the columns, thus eliminating difficult formwork at the beam/column intersection. Beam haunches should be avoided if possible. If haunches are necessary, design them with consistent dimensions.

• The least expensive roof slopes are those that achieve the required slope by varying the slab thickness or by using fills. These roofs may require better quality roofing membranes, but that cost will be offset by maintaining a constant horizontal structure. One-way slopes demand labor-intensive positioning of the deck at various elevations and subsequent sloping of the beams parallel to the slab in order to avoid variable beam depths. With ridges and valleys running in both directions, the two-way slope requires the formwork be changed to conform to each slope, which is extremely costly.

Vertical elements

Although vertical-structure formwork costs less than horizontal, its cost also varies with design complexity. The designer can reduce cost and increase efficiency with some basic strategies.

• First, the size and shape of the columns should be kept uniform. If increased loads need to be accommodated in one area of the building, it may be more economical to increase the strength of the concrete or add reinforcement than to increase the size of the columns for that area. If these alternatives aren't possible, it is best to increase the size one dimension at a time, in two-inch increments. (A 24x22-inch column first would be increased to 24x24 inches.) Regular column layout and orientation also facilitate use of cost-effective forming methods, such as gang and flying form systems.

• If possible, wall thickness should remain constant. If not, it should be varied in two- or four-inch increments. It is also more efficient to step the formwork toward rather than away from an opening or edge when increasing a wall thickness.

• If the core area is designed consistently from floor to floor, with a symmetrical, rectilinear shape, costs can be significantly reduced. Further savings can be expected if the floor and wall openings are of constant sizes and kept to a minimum.

• Pilasters, if they can't be avoided, should be spaced uniformly and be of standard dimensions. Ceco recommends that they be designed with raked sides to facilitate quick form removal.

For further information contact:

Concrete Reinforcing Steel Institute, 933 N. Plum Grove Rd., Schaumberg, Ill. 60173-4758.

The Ceco Corp., 1400 Kensington Rd., Oakbrook, Ill. 60521-9743.

The American Concrete Institute, Box 19150, Detroit, Mich. 48219.

—Timothy B. McDonald

At first glance, it's difficult to imagine how these six different buildings are related. But if you take a closer look at their histories, you'll find they all share a common theme: the washrooms in all six buildings have been refitted with Sloan flushometers.

True, these buildings don't look old enough to need major plumbing repairs. But the fact is, the original flushometers that were installed just didn't hold up. Even after repeated servicing, they continued to malfunction. They didn't shut off properly. They leaked at the stops. In some cases, they even flooded the washrooms. In short, they weren't Sloan flushometers.

Unlike substitutes, Sloan flushometers offer proven, reliable service. With built-in quality at an affordable price. That's why today more buildings are equipped with Sloan flushometers than with any other brand.

Only Sloan's rugged, tamper-proof design can assure the quiet, dependable operation so critical in buildings like these. Plus, Sloan flushometers are built to last for years with only minimal, routine maintenance—an important consideration for owners who value time and money.

The next time you consider specifying a substitute, think about these six buildings. Then specify and insist on Sloan. The first time.

More Six major reasons to specify Sloan... the first time.

1. Angelina County Exposition Center, Lufkin, TX **2.** Linpro Company, Berwyn, PA **3.** Northwood Jr. High School, Meade, WA **4.** Barnett Plaza, Orlando, FL **5.** Cow Town Colosseum, Fort Worth, TX **6.** CNA Tower, Orlando FL

SLOAN VALVE COMPANY
10500 Seymour Avenue, Franklin Park, IL 60131
A Tradition of Quality and Pride

Circle 41 on information card

BOOKS

Disappointing Account Of the Bauhaus Years

Inside the Bauhaus. Howard Dearstyne, edited by David Spaeth. (Rizzoli, $35.)

We badly need a good book on the Bauhaus. But this is not it.

We know that this German school of design, founded by Walter Gropius in Weimar in 1919 and closed by Mies van der Rohe in Berlin in 1933, was, as Nikolaus Pevsner put it, "the paramount center of creative energy in Europe." It was the clearinghouse of many of the ideas that have shaped 20th-century art, architecture, and design. The energy still propels us. We still keep arguing about the ideas.

But we are also still—or again—as confused as the Bauhäusler were about the basic questions modern technology and mass society have raised about how to build a good home. What should be the goals of architecture? Should it really do nothing more than look pretty, make money, and keep people out of the rain?

The Bauhaus and, largely under its influence, CIAM (the Congrés Internationaux d'Architecture Moderne), thought differently. Its creative anguish produced more than uncomfortable steel chairs and buildings that have gone out of fashion. Bauhaus teaching methods, typography, and the paintings by Paul Klee and Vasily Kandinsky, among other things, did not.

But we have no objective assessment of what the Bauhaus really stood for, what it tried to and did accomplish, and what may make its objectives and design philosophy still relevant, possibly more relevant than those of say, the École des Beaux-Arts. Between the passionate propaganda of Gropius and Giedion and sardonic postmodernist Tom Wolfery, calm reason has been ground to shreds. Hans M. Wingler's Teutonic tons of Bauhaus documents are of little help. We need perspective.

Howard Dearstyne, who died in 1979 before the editing of this book was completed, is one of the few Americans who studied at the Bauhaus. He enrolled in 1928, after the Bauhaus had moved from Weimar to Dessau and just as Hannes Meyer was taking over the directorship from Gropius. He got his diploma in 1932, but stayed on with Mies van der Rohe, who succeeded Meyer, for three more years. After Hitler came to power, Mies moved the Bauhaus to Berlin but then closed it. Dearstyne continued to work privately with Mies. After his return to the U.S., he became associate professor of architecture at IIT.

The five years Dearstyne spent as an architect in Weimar were the most turbulent and creative in modern cultural history. They were the years of Marlene Dietrich's and Josef Sternberg's "Blue Angel," of Bertolt Brecht's and Kurt Weill's "Three Penny Opera," of Thomas Mann's and Franz Werfel's novels, of dada and constructivism, of Klee, Kandinsky, Lehmbruck, of Albert Einstein and Max Planck, of Moholy-Nagy and Herbert Bayer.

The atmosphere was electric with creative tension. The passionate discussions in the cafes of the short-lived republic were punctuated by shooting in the back alleys—Nazi storm troopers and Communists fighting it out. In the end, the Weimar years had a profound effect on America. The most prominent German artists, architects, and scientists came to the U.S. because Hitler had made life, let alone creative life, impossible for them in Germany.

But Dearstyne seems to have been oblivious to all this. Except for telling us that he had some difficulty with the German language (which shows in the misspelling of German words), he might be telling us about a design school in the U.S. hinterland in the 1970s. His account from "Inside the Bauhaus" puts the Bauhaus in a vac-

continued on page 132

Hvitträsk: The Home as a Work of Art. Marika Hausen, Anna-Lisa Amberg, and Tytti Valto. (Museum of Finnish Architecture, Kasarmikatu 24, 00130 Helsinki 13, Finland, $30 postpaid.)

Everyone has heard that architects are like shoemakers—whose children are the last to be shod. But like Frank Lloyd Wright's Taliesin and Taliesin West, Eliel Saarinen's Hvitträsk is a brilliant illustration of what an architect can do to make his own house a work of art. Marika Hausen, longtime student of Saarinen's 1904-08 design for the Helsinki train station, has provided the conceptual frame for this study, rounded out by her collaborators' descriptive detail and social history.

This is a charming book about a delightful, important, and too little known house. One can easily understand the fascination it had not only for its creators but for the many cultural figures—Mahler, Sibelius, and Maxim Gorky, to name a few—who visited there. The craftsmanship of Loja Saarinen that contributed to the rich interiors (below) is suggested in this well-illustrated volume. But most of all it is the integration of the house with its natural environment that appeals, and shows why from 1923, when the Saarinen family moved to America, to 1949, they spent part of every year there.—Frederick Gutheim, Hon. AIA.

Mr. Gutheim is a Washington, D.C., author, critic, and educator.

Books *from page 131*
uum and makes his story vacuous.

Nor is there much historic interest, either. For the first 60 or so pages, Dearstyne quibbles pedantically with Gropius about the early, chaotic Weimar years while he was far away, studying at Columbia. The argument, complete with Gropius's indignant replies, was carried on in American magazines in the 1950s and is reprinted here.

Dearstyne's evidence is often flimsy. And the book's typography—Dearstyne's own text is set in blocks of semibold sans-serif types, flush left, and the quotations are set in blocks of light sans-serif, flush right—looks like a parody of Bauhaus typography and is hard to read.

Most of the book is devoted to the various workshops and who did what in them, a sort of narrative catalog without evaluation. Dearstyne is less bland when he writes about the Klee, Kandinsky, Hannes Meyer, and particularly Mies—all of whom he obviously liked. Unfortunately, however, his accounts are too impersonal to acquaint the reader with these people, who are, after all, among the more important figures in our culture. Nor does Dearstyne add any new information to the existing Bauhaus literature.

—Wolf Von Eckardt, Hon. AIA

Mr. Von Eckardt, who has written architectural criticism for The Washington Post *and* Time *magazine, lives in Washington, D.C.*

Style 1930. Klaus-Jurgen Sembach. (Universe Books, $12.95.)

Style 1930 is something like an exhibition catalog. Its four parts comprise an introductory essay and three thematic units: "Creating a Style," "The Photographers," and "Reaching the People." It is Sembach's intention to convince us that works of design and photography produced in Germany around 1930 were linked by conscience and a desire to create "sign posts to a better world," and that these artifacts evidence a new style.

The 1920s are thought of as experimental, and toward the end of the period signs of maturity and refinement appear, in which doctrinaire theorizing, excessive formalism, and expressionism of the decade were replaced by the "New Objectivity" *(Neue Sachlichkeit).* There is no doubt that this period was complicated. Elements and principles of design were still being worked out amidst the drumbeats of the Bauhaus and the rise of National Socialism. Sembach is a little uncomfortable with these parallel developments, but insists that the cool, autonomous art of this period began to take its cue from life and to extend itself to the people.

The book's exhibition section shows examples of architecture, graphic design, portrait photography, and fashion, with many juxtaposed to complement each other and document the development of the style. But it is difficult to imagine this cluster of intentions amounting to a style, since modern architecture, the key element in the argument, tried so hard not to be a style.

Whether or not this collection of products approximates the kind of cultural event we associate with a style is not proven in this book. Indeed, it seems that in 1930 one person's *sachlichkeit* is another's *gemutlichkeit,* leaving the question of the significance of the diffusion of this style still unknown.—Herbert Gottfried

Dr. Gottfried teaches at Iowa State University's college of design.

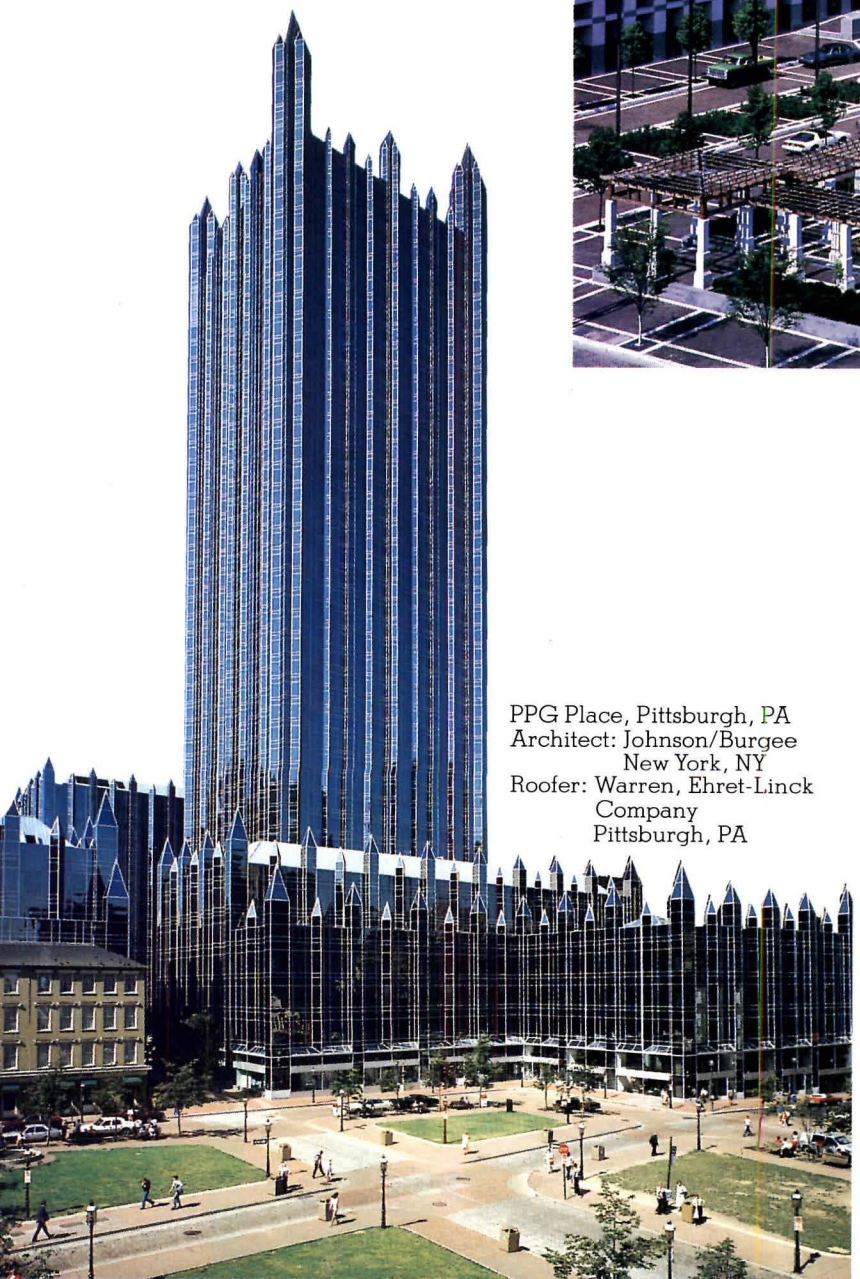
Alvar Aalto: The Decisive Years. Göran Schildt. (Rizzoli, $40.)

With this volume, the second in a series, Göran Schildt establishes the process that came to work in the shaping of Alvar Aalto's creative personality during the years of his professional establishment and his involvement with architecture on a global basis. The inquiry covers Aalto's "functionalist" period, when the architect's efforts were endless and multidirectional. To build, to write, to exhibit, to travel abroad, to participate in conferences were equally decisive for Aalto; as was his "knack" for selecting competent associates to initiate cultural institutions encouraging public education that could produce clients in the future; and his ability constantly to seek "kindered" people (such as Asplund, Markelius,

continued on page 135

TCS and the Corporate Ediface

Procter & Gamble General Office
Cincinnati, Ohio
Architect: Kohn—Pedersen—
Fox Associates
New York, NY
Roofer: Imbus Roofing Company,
Cold Spring, KY



PPG Place, Pittsburgh, PA
Architect: Johnson/Burgee
New York, NY
Roofer: Warren, Ehret-Linck
Company
Pittsburgh, PA

There are many striking examples of how TCS (terne-coated stainless) has become an integral part of a total architectural concept...expressed so beautifully as roofs on the Procter & Gamble building and on the many roofs of PPG Place. Weathering to a predictable warm, natural gray, TCS blends quietly with the buildings' architectural expression.

Aesthetics aside, however, TCS has impressive functional credentials. Among them are great tensile strength combined with light weight, exceptional resistance to corrosive environments, complete freedom from maintenance... thereby promising a durability measured in generations rather than years. We'll be happy to send you substantiating evidence. Call us toll-free 800-624-6906.

FOLLANSBEE

FOLLANSBEE STEEL • FOLLANSBEE, WV 26037

Circle 45 on information card

Put this in your plans and relax...

because you can specify DORMA BTS concealed floor closers with confidence

DORMA BTS 80 and BTS 75 Series are proven worldwide as the most technologically advanced floor closers available anywhere. Their outstanding features include:

- **Compact body dimensions suitable for thin-slab construction and doors up to 4'6" wide and 660 lbs.**
- **Selective multi-point or automatic single-point hold-open and adjustable delayed action**
- **Heavy-duty backcheck and pressure relief valve to protect closer, door and frame**
- **Interchangeable spindle system for on-site adjustment to suit specific conditions**
- **Dual thermostatic valves for consistent closing speed as temperatures change**
- **ANSI A156.4 — 1986 Grade 1 certified**
- **Five-year warranty**

Call or write for a free brochure describing DORMA BTS concealed floor closers or any other product in the DORMA line of concealed, life safety and surface-applied door closers.

Door control—the **DORMA** *w*

DORMA Door Controls Inc., Dorma Drive
Reamstown, PA 17567
Tel. (215) 267-3881 • FAX (215) 267-2106

DORMA Door Controls Ltd., 1680 Courtney Park Drive
Unit 13, Mississauga, Ontario L5T 1R4
Tel. (416) 673-1281 • FAX (416) 673-5850

Books *from page 132*
Moholy-Nagy, Gropius, and Giedion) from whom he would always gain.

In covering all this Schildt digs deep and interviews many of Aalto's surviving associates and friends, who were actors of one kind or another in the architect's life. An extraordinary evidence of humanity springs from this documentation. Aalto, the boss, the "chief," could perhaps teach us, even with his postmortems, that the most fundamental prerequisite for human architecture is the human dimension and manners of the creator himself.

Yet Aalto was a human being in flesh and blood and spirit, and Schildt neither minces words nor becomes a victim of idolization. He is forthright and has ample evidence to prove whatever he says. He demystifies the false impressions regarding Aalto, talks about his several defeats in competitions, and clarifies attributes of Aalto's personality—his "pushiness" in professional as well as self-promoting matters, his habit of never giving credit to those who influenced him or whose ideas he embraced and elaborated upon, his "hypersensitivity and unstable temperament," and his politically noncommital attitude.

In a closing tour de force of personal, deeply felt prose, Schildt offers his own interpretations of the significance of this period of Aalto's life and states his concept that in Aalto's later and mature work he managed to bring "the deepest conflicts of our age into an exemplary harmony." And to confirm his contention that Aalto's goal was akin to that of artists of classical Greece, he closes his book with what promises to be the introduction and subject matter of his next volume: "I stand before Säynätsälo Town Hall, Rovaniemi Library, and many other Aalto works with the same inexpressible feeling of joy as before the Parthenon in Athens."—ANTHONY C. ANTONIADES, AIA

Mr. Antoniades is professor of architecture at the University of Texas at Arlington.

Court & Garden: From the French Hotel to the City of Modern Architecture. Michael Dennis. (MIT Press, $40.)

This ambitious book combines architectural history and theory in three distinct texts. The first, and longest, is a close examination of the development of French aristocratic town houses—*hôtels particuliers*—from Henri IV to the French revolution. The second is a critique of the theories of urban planning espoused by Le Corbusier and the modern tradition. Last comes a brief look at American architecture. Michael Dennis suggests that *hôtel* planning traditions could ameliorate the damage done to the American urban fabric by modernism's "architectural anorexia."

Opening bird's-eye illustrations of Versailles and Los Angeles make his point: that the hierarchical public order of the baroque era has dissolved into the atomized individualism of modern times. "And if one cherishes the advance of individual liberty after the *ancien regime,* then, equally, one just as readily laments the passage of civic responsibility and the urban forms that express and promote it." Dennis finds in the evolution of the French *hôtel* a fertile tension between public and private spaces that generates the possibility of an urban middle ground between despotism and anomie.

The history Dennis presents is rich with detail and interest; the illustrations alone present a lucid vision of Parisian architecture. When he examines it on its own terms, the book is original and instructive. But when it becomes grist for his polemic, both examples and theory suffer. One can support his advocacy of the public realm, while remaining skeptical that the urban villa can serve as its model. Still, *Court & Garden* is a provocative book, fascinating in its subject and timely in its theme. It will stimulate those interested in the 18th century, and those struggling with our own.—THOMAS MATTHEWS

Mr. Matthews is a New York City writer about architecture and travel.

The Indian Style. Raymond Head. (University of Chicago Press, $37.95.)

Eighteenth-century entrepreneurs returning to Europe with the riches and

continued on page 136

Books *from page 135*
images of foreign encounters found a continent on the threshold of change. The era was marked by circumstances that created a new awareness of history and foreign civilizations and a breakdown of traditions in the use of architectural elements.

In his book, *The Indian Style,* Raymond Head points out that it was Sir Joshua Reynolds, first president of the Royal Academy, who stated in his 1786 *Discourse* that classical architecture was failing to stimulate the imagination. Reynolds suggested examining new architectural models to find evocative and expressive elements and styles. Architects began to adopt and adapt foreign exotica as variety, novelty, and idiosyncrasy were embraced as a liberating departure from a "tired" classical tradition.

The voyagers from India to Europe at this time found a sensibility and readiness to receive and cultivate new stylistic possibilities. This book is about the creation of an Indian style—Westernized decoration and ornamental motif derived and translated from Indian architecture.

Head traces the progression of this stylistic subset with the first images resurrected from memory and conveyed to stonemasons. Later, as more accurate representations were brought back by Stuart- and Revett-like pilgrims, the likeness to and qualities of Indian ornament became greater and richer. This acquired style was often indiscriminately applied to building types and, once selected, pervaded the designs in unorthodox ways. There is, for instance, Samuel Pepys Cockerell's Sezincote of Gloucestershire, England, which was an "Indianized" estate in a Mughal-like, Taj Mahal setting replete with a "Hindu" order carried throughout the decoration. Another example is the "mosque style" boiler pavilion of the 1867 Paris Exhibition, which was crowned by a minaret chimney. The book's illustrations show the creative, skillful, but frequently bizarre applications and mutations of Indian motifs in Western architecture.

The author discusses the unique progression of synthesis of Indian craft and British imperial image. Respect was heightened for Indian craft as its documentation and subsequent public awareness was strengthened. The British architect serving in India slowly began to allow Indian craftsmanship to prevail on basically British-inspired massing. This integration also took hold in England as the Indian style became an expression of nationalism and imperial might. Elements derived from Indian architecture became prototypical for British colonial public buildings.

After the industrial revolution, it was feared that the artisan would be driven from the workplace and craftsmanship would be weakened and displaced. But the Indian style, by its intrinsic hand-worked nature, retained the spirit of the artisan in the arts and crafts tradition.

A topic not fully covered in the book and, indeed, excluded in the title is the transformation of the original Indian type, model, or form as opposed to the simple and more visual translation that "style" suggests. This involves the purity and meaning of Indian design in contrast to its Western interpretation. The bungalow, veranda, screen, and chhatri (small aedicular pavilion) are derivations of original Indian forms, deeply rooted in Indian culture and tradition. They transcend the temporal curiosity and novelty of Indian ornament and challenge the intention of style to revive a more rooted architectural base, rather than relying on cosmetic composition. The author approaches this topic when he cites the extent to which the concept of the bungalow permeated the American landscape. He points out that its proliferation bestowed on California the nickname of "Bungalow Land." But the idea requires much deeper exploration.

Stylistic Indian influences can be found in contemporary Western architecture such as Hans Hollein's 1978 travel bureau in Vienna, in which an Indian architectural element, the chhatri, is used as artifice to appeal to the visitor's romantic sensibilities.

The Indian Style spotlights the continuing curiosity and evocative appeal of this persuasive motif, which hardly reached its climax with the fantasy of the Brighton pavilion.—CLAUDIA RUSSELL

Ms. Russell, an architect in Cambridge, Mass., studied in India on a William Kinne Fellows traveling fellowship from Columbia University in 1983.

Books continued on page 139

Minka, Traditional House of Rural Japan. Chūji Kawashima. Translated by Lynne E. Riggs. (Kodansha, $60.)

Few houses anywhere match *minka's* archetypal sheltering. These venerable Japanese dwellings of common people are instinctively accepted as timeless symbols of a house. One does not tire of their earthy vitality. Comparisons with more elegant villas seem out of place.

Chūji Kawashima's book is beautiful, and it attempts a systematic description of this building type. There are only three other books in English on this subject: Teiji Itoh's *Domestic Architecture of Japan* (Weatherhill); Yukio Futagawa's and T. Itoh's *Traditional Japanese Houses* (Rizzoli), which is a revision of *The Essential Japanese House;* and Norman Carver's photographic essay, *Japanese Folkhouses* (Documan Press).

This 260-page volume is divided into three parts: basic features, structure, and styles. It offers a brief introduction, glossary, and index but lacks bibliography and footnotes. It is largely a condensed version of Kawashima's three-volume set, *Horobiyuku Minka,* published in Japanese in 1973-76. The book contains more than 400 superb drawings and black-and-white photographs. The translation, likewise, is excellent—in itself a considerable feat.

The introduction, basic features, and structure sections are the least adequate parts of the book. The reader is left with the impression that *minka* are farmhouses, yet the term (folkhouse is only an approximate translation of this building type) includes town houses of common people. This book does not convey the significance of these structures, nor does it discuss the relationship of *noka*—the farmhouse—to other dwelling types. It is purely descriptive. Unfortunately, the description of the elements that comprise the house is also inadequate. Many questions about the structure, particularly about the different framework types, remain unanswered.

Minka, despite its simple materials, is a sophisticated and complex building type. Its hierarchic structural system and process-based spatial order contributed to its survival and adaptation over centuries. These principles may well be unique and of great importance to any study of the evolution of architectural space, yet this is not evident from Kawashima's book.

The book is indicative of the unfortunate and misguided attitudes of Japanese publishers interested in the Western market. There is the assumption that Western readers cannot possibly understand the complexities of Japanese culture and that not too many readers would be interested in a detailed analysis of *minka* or other aspects of Japanese houses. Consequently, we are presented with an absurd reduction of Kawashima's first volume. The layman will quickly tire of the Japanese terms, and the serious student will be frustrated by the deletions and the scanty treatment of this worthy subject. There are so many local variations in details, techniques, and terms that the study of *minka* is extremely difficult for Japanese and Westerner alike. The abundant use of Japanese terms is likely to create a misleading impression of their universality.

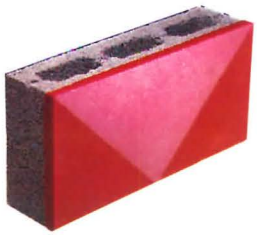
Many of the photographs are well-known houses that remain unidentified, and the inconsistency is puzzling. On occasion, some famous houses, such as the Murakami house, are mislabeled.

The second half of the book is indispensable, as there is no comparable material available in English. The 150 pages devoted to "styles" is very accessible. The roof is certainly a dominant element of the rural *minka,* and Kawashima's classification of styles is based on the roof forms. This somewhat formalistic approach will certainly convey the rich regional diversity in shapes, materials, plan variations, techniques, and expressions. There is much that one can learn from the representative selection of houses. Excellent plans and sections accompany the photographs.

Kawashima's *Minka* is not the definitive work on these fascinating and beautiful structures. Hasty editing and the misdirected purpose of the book are lamentable. Despite its shortcomings, it does provide us with the most comprehensive coverage of representative folkhouses, and the graphic material alone is well worth the price. Readers will be asked to endure Japanese terminology, but to endure is Japanese.—Guntis Plēsums

Mr. Plēsums, professor of architecture at the University of Oregon, is an architect who teaches Japanese architecture. His analysis of minka *dwellings appeared in this magazine's October 1986 issue.* □

New Creative Exteriors*



UNIQUE NEW LIGHT-SENSITIVE DESIGN SERIES lets you create dynamic, 2-tone effects with revolutionary Reflecto-Lite™ faces.

UNUSUAL SHADOWS AND HIGHLIGHTS with sculptured block such as Rib™ and Flared™ faces.

COLORS unlimited. Designer, Custom, and Standard Series.

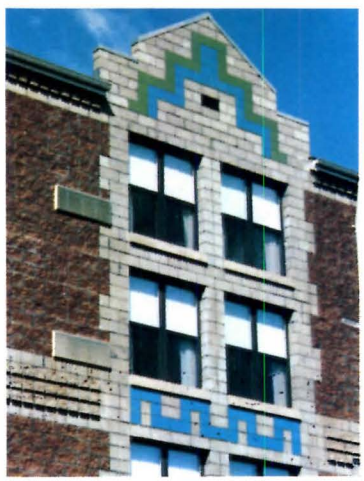
SCALE & PATTERN provide versatility for individual designs, such as 8 x 8 scores.

RELIABILITY. Proven performance in all kinds of weather, for over 35 years. Maintenance free.

ECONOMICAL INITIAL/LIFE-CYCLE COSTS and still enjoy design flexibility and proven performance.

The Burns & Russell Co., Box 6063, Baltimore, MD 21231. Phone 301-837-0720. 4.4/Bu in Sweet's.

Innovative Masonry Products Since 1790.



*Spectra-Glaze II® CUSTOM PRE-GLAZED CONCRETE MASONRY UNITS

Meeting the Increasing Demand To Make Buildings More Secure

Security is a topic on the minds of a growing number of clients, as is evidenced by the mushrooming supply of security products. This demand for more secure facilities, coupled with computerized technology, is making access control into a science of its own. Electronic key systems are the perfect examples.

The Intellis electronic locking system by Schlage Lock provides security for hotels and motels through the use of an Apple Macintosh computer and an electronic key-making console. Standard credit-card-sized "keys" with magnetic stripes are encoded at the console with one of billions of lock combinations. The keycards unlock guest room doors fitted with microprocessor-controlled locks, which fit standard door preparations. Consoles are networked to share information and to allow staff to create keycards in advance for group travelers without tying up the front desk's consoles.

Keycards issued to the staff can be customized so that certain cards open doors only in assigned sections during their shift, providing unprecedented control over room access. Each keycard is unique, providing an additional level of security. The lock's microprocessor records the last nine entrants to a room and the time of entry. This information can be read when a hand-held computer is connected to the lock. Intellis has an optional beeper designed for the seeing-impaired, in addition to standard indicator lights that show when a room is locked or unlocked.

The Proximity 2000 from Cardkey Systems reads concealed tags or cards over a 12-inch to 16-inch distance, controlling access into a secure area for up to 65,000 individuals. The FCC-approved system stores codes for up to 65,000 different sites and individuals, and can be integrated into an existing Cardkey access control system, or one using a different card-reading technology.

The system operates as an on-line, off-line, or stand-alone device and can also monitor up to eight supervised alarm contacts. The Proximity 2000 has low frequency tuned circuits, making the system less prone to interference than most comparable equipment. Card reading is unaffected by nearby metal objects in a building or in a user's pockets.

The DCS-1000 security/card access system by Cardware Systems is a computerized turnkey system that also automates a company's time and attendance collection and payroll processing, and generates custom-tailored management reports. The system supports up to 256 remote controllers within a radius of 8,000 feet of the main controller, and will handle up to eight separate security levels. The DCS-1000 system includes a main controller; remote controller with card reader, door strikes, and hardware; a menu-driven software package for communication; and applicable software.

Two Proximity access control alarms available from Schlage Electronics (SE) are based on hardware and software used in the SE 708S system, a multiple-door electronic access control system introduced in 1983. Model 804S controls up to four doors and monitors as many as 16 alarm points; the Model 808S controls up to eight doors and monitors up to 32 alarm points. Both systems can be programmed and controlled locally or with a modem over dial-up telephone lines. Individual access can be controlled by card code, time of day, day of week, and door groups, all on a door-by-door basis. Systems are designed to accommodate up to 30 holidays or shutdown days.

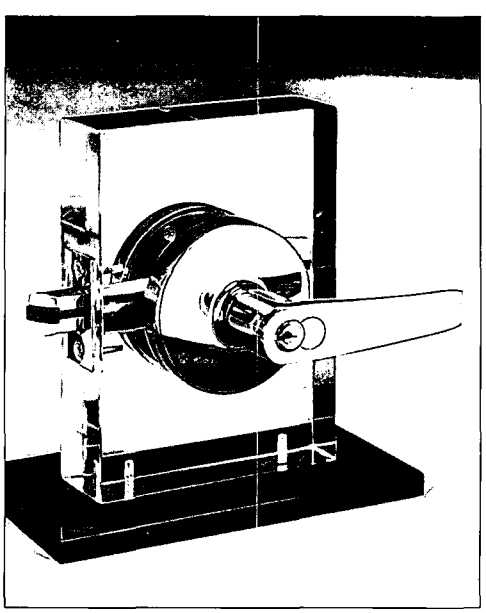
The weatherproof systems operate by using a noncontact card-reading technology invented by SE. There are no slots or slides. Authorized access is gained by passing a credit-card-size command key within a few inches of a passive sensor near the entrance. These sensors can be surface-mounted, attached behind glass, or encased in a wall.

EntryPlus is a building access control system that operates much like a bank cash machine, from EntryPlus, a security system company of Dover Elevator. The system controls entry to doors and elevators in office and apartment buildings, keeping a record of who goes to what floor, at what time, and on what date, after normal business hours. This information can be printed out for building owners and managers. Each building tenant is assigned a four, five, or six digit code number that is entered into a keypad that allows entry to building doors and elevators.

The central control unit operates from menu-driven, interactive software and has a built-in liquid crystal display monitor where step-by-step programming instructions appear. The control unit and printer are compact enough to be placed on a desk, table, or shelf. The system is flexible and can be programmed to accommodate the different working hours of various

continued on page 143

Products *is written by Amy Gray Light.*



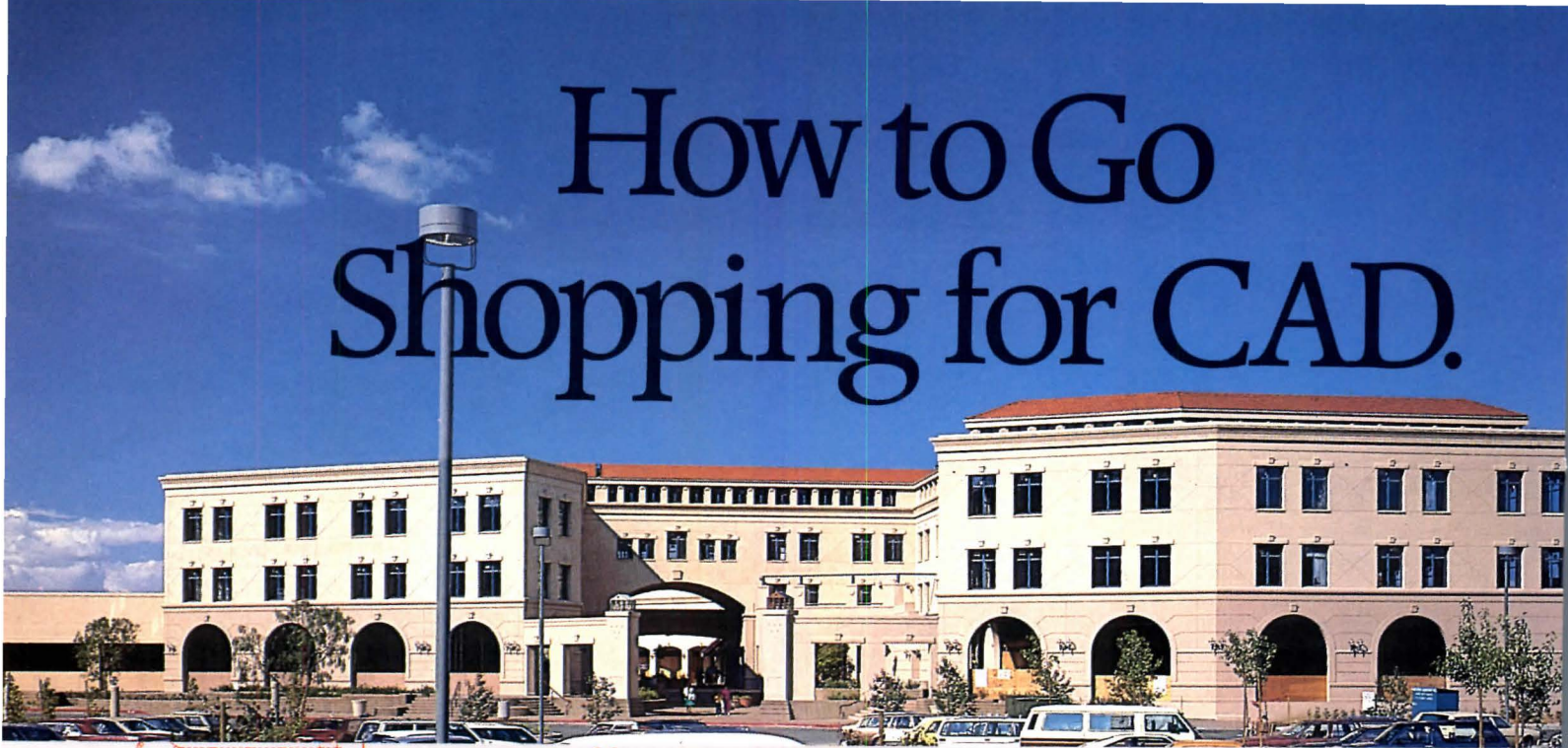
Barrier-Free Openers

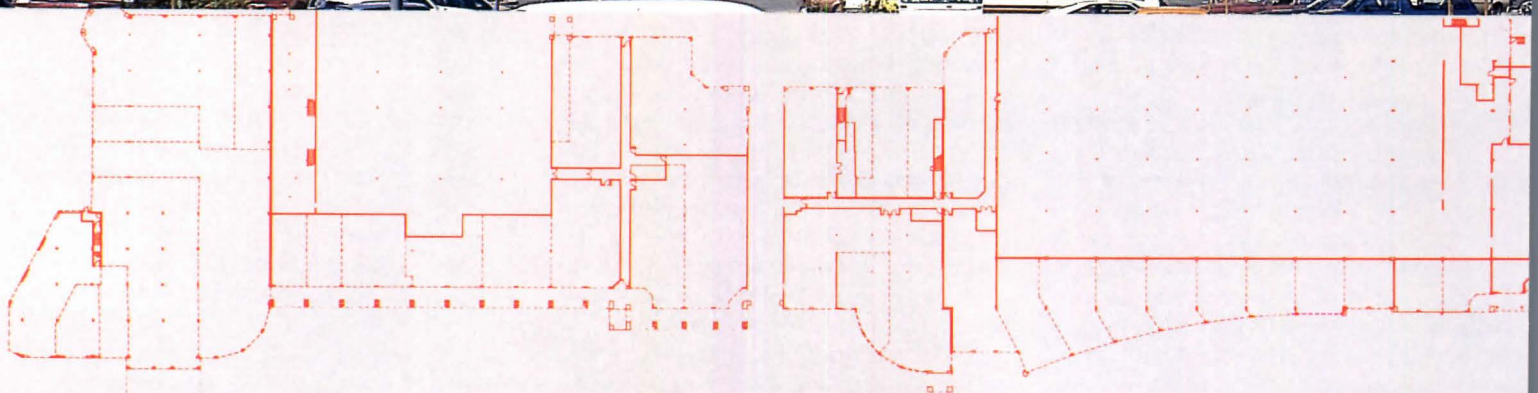
Installing increasingly barrier-free locksets in new or renovated buildings is a relatively new trend already adopted by 22 states. This developing tendency is based on the incorporation of a revised standard, 1980 A117.1, formulated by ANSI, into the state building codes. The standard specifies that locksets be designed in such a manner that the handle need not be tightly twisted, grasped, or pinched to open the door. Lever-handle, push-type, and U-shaped handles are cited as preferred designs.

Along these lines, Corbin Emhart has introduced the Corbin 700 Series of heavy-duty, lever-handle cylindrical locksets that provide the security of a one-inch dead bolt in a cylindrical lock. The 700 Series functions as both a latch and a dead bolt.

Corbin Emhart
Circle 258 on information card

How to Go Shopping for CAD.





With personal computers becoming ever more powerful and affordable, there's never been a better time to look into the benefits of doing your design work on one.

At Autodesk, we've put together a few guidelines to help make shopping for a system a little easier.

Draw Up a Plan.

First, consider the software. You don't want to spend months learning it (you've already spent enough time learning your profession). And you don't want to shell out a bundle, either.

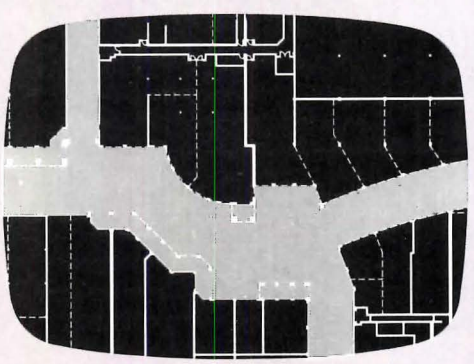
Consider AutoCAD AEC.® The name stands for architecture, engineering, and construction, and it works in tandem with our industry–leading AutoCAD® package. Which itself has introduced computerized drafting to over 90,000 people.

Put AutoCAD AEC on your choice of more than 30 popular microcomputers, and you can set up an entire system that's well within your budget.

One-Stop Shopping.

Next, consider a system that gives you all the features that are important to your work. Starting with accuracy and speed.

With AEC, distances are dimensioned, and schedules generated, automatically.



Detailed plan of center at the tower point.

Routine drafting is faster. Even the process of transmitting plans is speeded up, reducing overall project time.

Customization is important, too. So AEC makes it easy for you to create your own specialized symbols.

All of which results in less time spent on drudgery, and more time trying out new ideas.

Which, after all, is what good design is all about.

The Value of a Name.

There's a lot to be said for going with the leader in the field.

Like the comfort of knowing that nearly two out of three of your colleagu doing microcomputer AEC application are using AutoCAD products*

Or the confidence of knowing that most major architecture schools a teaching AutoCAD.

Or the security of knowing that wit authorized AutoCAD training centers ac the country, there's sure to be one near y

Want to see how AutoCAD AEC ca help you? For a demonstration, just see y nearest AutoCAD dealer. Or call or writ for the name of one in your area.

And see how easy shopping for CA can be.

AUTOCAD®

AUTODESK, INC.
2320 MARINSHIP WAY
SAUSALITO, CA 94965
(415) 331-0356
OR (800) 445-5415
TELEX 275946 ACAD UD

Plans for the Corte Madera Town Center were generated on AutoCAD AEC and provided courtesy of Fielo/Gruzen Associated Architects, Rasmussen Ingle Anderson, Developer: Reining & Corporation.

*TechPointers Sept. 1986

Circle 53 on information card

Products *from page 141*

tenants in the building. Individual codes can be assigned so that some tenants have access to all areas of the building while others have access only to one or two floors.

A "sign in" data capture capability is now available as an option for Elcom Industries' ACU 700 card access control unit, which provides data logging and time zone sensitivity.

By using a magnetized card, a user gains access to controlled areas. "Sign In" provides a printout log of who entered or who was denied access to restricted areas and when. A serial printer can be attached for concurrent printing or subsequently connected for retrieval of data. Time zones and day-of-the-week sensitivity can be programmed into the stand-alone reader in order to control access to restricted areas during select hours and certain days of the week. There is a holiday override option.

Voxtron's Veritron 1000 voice verification biometric access system operates on positive personal recognition by identifying the individual's voice characteristics before allowing entry. The user has an assigned identification number registered into the computer, so all he or she has to do is repeat words selected by the computer into a phone receiver. The Veritron system provides a positive individual audit trail, tracking individuals as they move through a monitored location. The expandable system consists of a Texas Instruments 16-bit CPU, a high-resolution color display, a keyboard, a printer, and two voice-processing boards. It can be used as a stand-alone or an add-on system for companies with other security controls.

Cellular Control Systems introduces a wireless electronic card access control and security system for hotels and motels that provides instant rekeying for each room directly from the front desk, accepts standard credit cards, controls access and monitors alarms to each room by card number, date, and predesignated time periods, and centrally stores all transactions. The system may be expanded to include in-room guest services and life-safety components.

Centry, an entry management service system introduced by Honeywell, is programmed and managed at a Honeywell customer service center. Users are given coded passcards that permit authorized entry to specific doors at specified times. The passcard code can be changed at any time without affecting other passcard holders. Other Centry features include automatic locking and unlocking of scheduled doors as determined by the building manager; prompt notification if a Centry-protected door doesn't close properly; authorization for after-hours visitors by calling the service center; and printed reports listing all passcard holders, their authorized doors and times, plus all entry activity. Centry can also be integrated with Honeywell's security, fire alarm, and sprinkler systems and with closed-circuit television to provide complete building and tenant protection.

Schlage Lock Company
Circle 241 on information card
Cardkey Systems
Circle 242 on information card
Cardware Systems Inc.
Circle 243 on information card
Schlage Electronics
Circle 244 on information card
EntryPlus
Circle 245 on information card
Elcom Industries Inc.
Circle 246 on information card
Voxtron Systems Inc.
Circle 247 on information card
Cellular Control Systems Corporation
Circle 248 on information card
Honeywell Inc.
Circle 249 on information card

Security Communications

A compact infrared security communication system from Electronic Control Security Inc. (ECSI) permits communication between security personnel and a local or central control station from any point within the protected premises, serving as a personal body alarm, as a transmitter of information on medical, smoke, or fire conditions, or as an "all's well" message. It can also be programmed to perform certain functions (such as turning on security lights) and then to transmit a message to the central station that the job has been done.

A UL-listed Terminus System of sensors, electronic processors, and annunciator/control panels by Litton for new or retrofit installations protects walls, windows, display cases, storage cases, safes, and other materials that can be used to gain access to a secured area by detecting intruders before they enter a protected area. The Terminus Sensor detects shock within an area of coverage on a window, wall, or fence through a perimeter device attached to the material that determines the sensing distances and the location of the sensors.

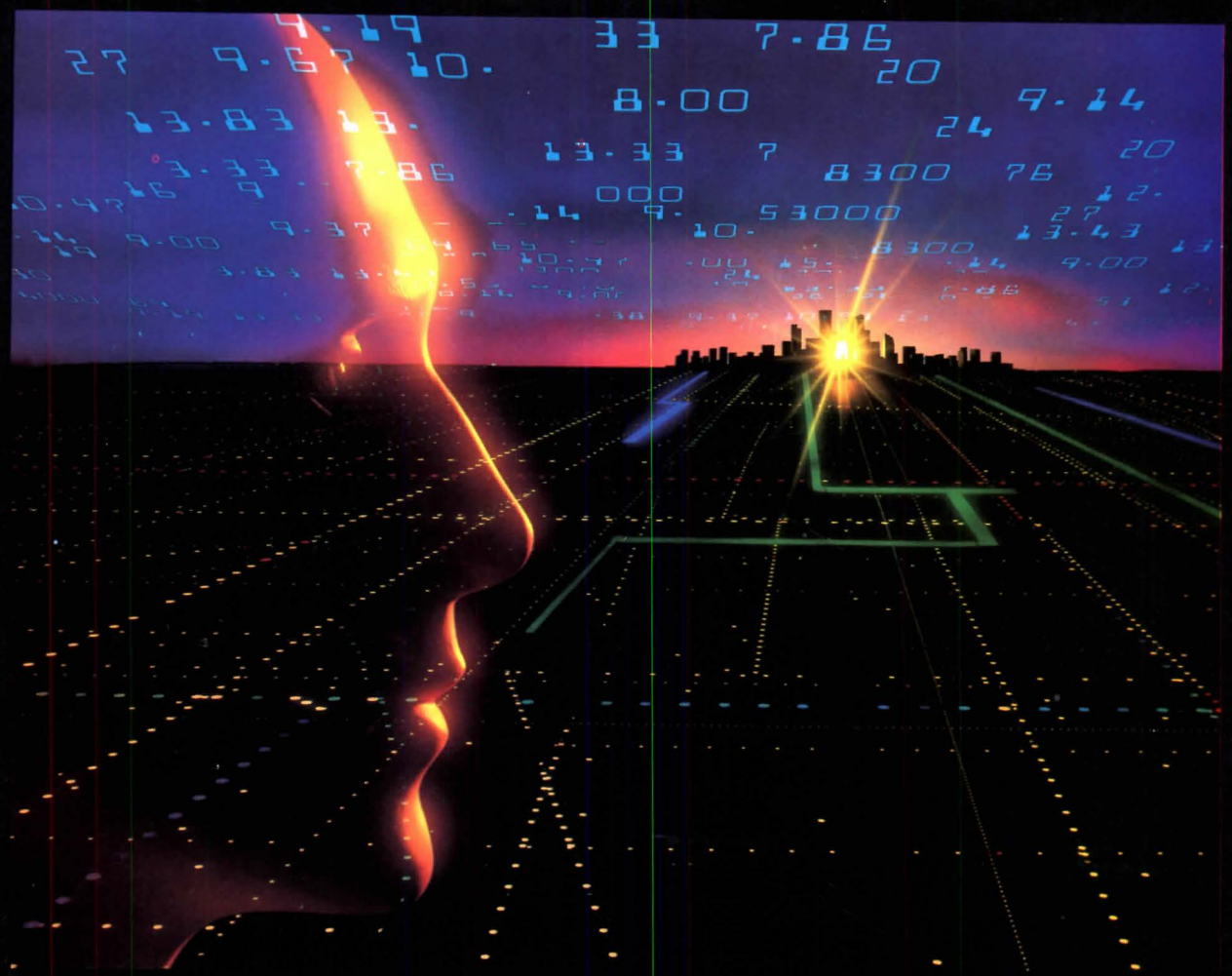
Electronic signal processors monitor Terminus shock sensors, which can be adjusted to distinguish between hammering, cutting, drilling, or breaking, and common vibrations caused by thunder, planes, trains, or vehicular traffic. This function significantly reduces the problem of nuisance alarms.

The Surveyor Alert alarm assessment system from VCS Inc. provides surveillance, acknowledgement, and support to users who have signaled for assistance in alarm situations.

The system is activated when an employee in the control area pushes a duress button to signal an emergency condition to a remote monitoring location. An alarm sounds that is not audible in the control area, and video surveillance

continued on page 145

H · A · R · P · E · R A · N · D S · H · U · M · A · N



NEW HORIZONS IN FINANCIAL MANAGEMENT WITH CFMS

Envision the successful design practice—a combination of good design and financial management. Harper and Shuman can help—with the CFMS family of products. CFMS—the Computer-based Financial Management Systems—are fully integrated project control financial management systems specifically developed for the design practice; they are sponsored by the AIA and endorsed by the NSPE/PEPP.

CFMS provides project control and accounting reports, payroll, billing, accounts payable, accounts receivable, financial reports, profit center reporting and an interface to spreadsheets. These modules run on minicomputers like Digital VAX and MicroVAX as well as Prime 50 Series or on a national timesharing service. MICRO/CFMS—our microcomputer based systems for smaller practices—runs these applications on the IBM PC, WANG PC, or the DEC Rainbow Series.

Over one thousand design firms are using CFMS and MICRO/CFMS to get the best out of good design and the bottom line. Call us today for more information.

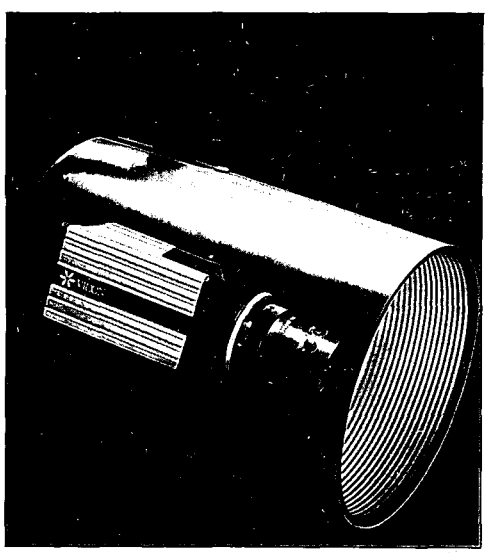
CFMS

68 MOULTON ST., CAMBRIDGE, MA 02138 617/492-4410
625 THIRD ST., SAN FRANCISCO, CA 94107 415/543-5886

Circle 55 on information card

Products *from page 143*
from the control area's closed-circuit television camera is displayed on monitors in the remote locations. A microphone in the control module picks up conversation and other sounds in the control area that are heard through remote speakers. Indicator lights on the control module, visible only to the operator, verify that the system has been activated. Alarm situations can be automatically logged by the user's access control system, and recorded by an alarm-activated VCR. The system has a reset button to return it to normal standby condition.
Electronic Control Security Inc.
Circle 250 on information card
Litton Poly-Scientific
Circle 251 on information card
VCS Inc.
Circle 252 on information card

Security Monitoring
A security surveillance system for discreet applications is Vicon's Gemini Series cameras, tiny solid-state black-and-white or color cameras that are fitted into housings externally identical to several different models of conventional track-lighting equipment. Charge-coupled device image sensors are a fraction of the size of conventional tubes, and contain no filaments so they do not generate heat. There is reputedly no geometrical distortion because individual light-sensing elements are permanently fixed.



New Mosler Monitoring Services from Mosler Inc. can monitor clients' facilities throughout the country. The user's equipment is maintained by trained Mosler service staff in every state and operates round-the-clock, every day.

With Mosler Monitoring Services, an alarm signal goes from the customer's premises via satellite, microwave relay, fiber optic cable, or telephone lines, to the national command center and back to the customer's local police or fire department in a matter of seconds. When the signal is received at the command center, an audio signal alerts the operator and detailed instructions appear on a color monitor. The data includes alarm type, location, police or fire numbers to call, and company officials to notify. The command center also notifies the Mosler office nearest the monitored premises through the Mosler electronic communications network so that Mosler technicians can respond immediately if service is required.

A residential control system from Enerlogic Systems Inc. manages lights, appliances, security, and HVAC systems from a central location. The ES-1400 is designed to be used with X-10 (or compatible) remote power and switch modules to control up to 256 electrical devices. The home control system's listening capability lets it make decisions and turn several devices on or off at any time or on any date.

Using existing wiring, the Enerlogic ES-1400 has its own microprocessor and real-time clock. A computer is used only for programming. The system includes home control software with built-in control functions that let homeowners control duty cycling and timing events or create and revise their own control functions.
Vicon Industries
Circle 253 on information card
Mosler Inc.
Circle 254 on information card
Enerlogic Systems Inc.
Circle 255 on information card

Restricted Exit Control
The Series 5000 restricted exit control system from Von Duprin prevents unauthorized use of a door by maintaining control of the door's opening after the device is activated and an alarm sounded. However, the door can be opened immediately for safe egress if smoke detectors, water flow indicators, or other emergency sensing devices are activated. The low-voltage system incorporates an electromagnetic lock and an electrically released exit device equipped with an alarm. It is compatible with single or double doors of all constructions. All major components of the system are compatible with retrofit or new-construction requirements.
Von Duprin Inc.
Circle 256 on information card

Security Systems Literature
A brochure from the Chicago Bullet Proof Equipment Company describes four types of UL-listed architectural hard-line security systems: bullet-resisting, penetration-resisting, blast-resisting, and activated barriers. Specific products mentioned include transportable guard enclosures, interior-based activated barriers (cold smoke and sticky foam), door/frame/hardware assemblies, wall panels, transfer units, vision and service windows, appliqué armors, and accessories.
Chicago Bullet Proof Equipment Company
Circle 257 on information card

Products continued on page 146

NEW AND NOTEWORTHY

Contract Document Development Software

An alpha-numeric CADD software program enables designers to select and specify products and materials and document logistics management and scheduling.

The ei: MicroSpec system begins a project at the preliminary design stage with an outline specification, allowing the designer to specify, document, and track product and material items; and accumulate all bills-of-materials by department and by drawing layer, material category, manufacturer, or whatever segmentation is required. Project management and logistics are facilitated with a note function that permits the automatic creation of tickle and follow-up reports by date, category, assembly, or individual item. Project cost estimating, purchase order generation, and integration into an easily customizable accounting system are also supported.

Electronic catalogs provide automatic product and material selection, information, and pricing for items. Predefined catalogs are available for Herman Miller, Westinghouse, Steelcase, and others, but the user may also create his or her own. The system requires an IBM AT, XT, or compatible with a hard disk.

eclat
Circle 268 on information card

Revised PC CADD Guide

A revised "PC CADD: A Buyer's Guide" features the same in-depth qualitative and quantitative analyses of best-selling PC CADD systems as the original pamphlet and also includes updated system reviews, new products, and expanded technical background information, particularly from the mechanical engineering sector. Buyers of the initial guide can purchase the revised edition for $50. The cost for first-time buyers is $170.

Graphic Systems
Circle 270 on information card

Architect-Designed Children's Furniture

An architect-developed line of furniture is made from such recognizable buildings and objects as the Parthenon, Eiffel Tower, Empire State Building, AT&T Building, Statue of Liberty, and others. Natural forms such as palm trees and cacti are also available. The wood furniture comes in a variety of Formica colors.

Fun Furniture
Circle 271 on information card

Insulating Wallpaper

A wall covering composed of a patented layer of thin aluminum and a safe infrared transparent color on a paper base is based on the "thermos bottle" principle of keeping heat in or out by means of its reflective inner lining. In the case of Thermodecor wall covering, approximately 65 percent of the heat emitted by the sun and the cool wave emitted by the air-conditioner is reflected backward by the aluminum through the colored layer into the room. The wall covering is Class A UL-listed for a low flame-spread rating of 10, zero fuel contribution, and zero smoke development. It can be supplemented with Thermodecor ceiling tile and vertical blinds for more insulating protection. Thermodecor comes in more than 50 designs and colors. Because it is designed to breathe and to allow moisture to pass freely, the wall covering doesn't have the condensation problems of dampness, discoloration, and delamination.

Aluma-Foil Insulation Corporation
Circle 272 on information card

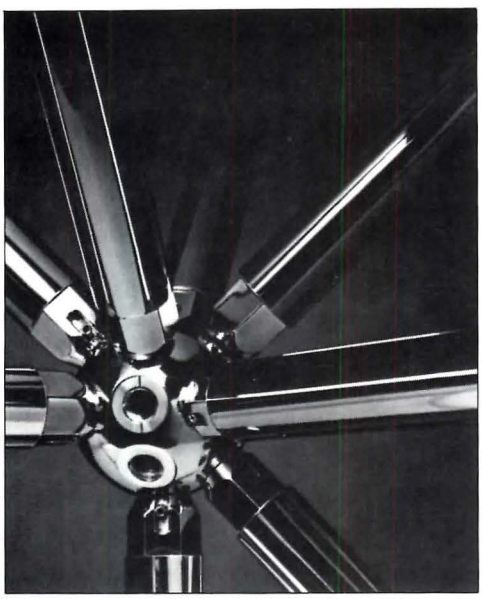
Colored Floor Grout

Durabond's AR-20 Acid Resistant Colored Floor Grout is now available in 20 designer colors such as Espresso, Taupe, and French Blue, to match or complement the wide spectrum of color tile being sold.

The AR-20 floor grout is developed for use in areas where mild chemical and acid or alkali resistance is required. Joints are grouted between glazed or unglazed floor tile, split brick, and quarry tile, curing with minimum shrinkage to a dense, hard joint that repels water, grease, and oil, and is nonrusting.

USG Industries Inc.
Circle 273 on information card

3-D Space Frame System
An Axent Design Guidelines brochure features a three-dimensional space frame product called Axent, shown below, which is used for interiors. Axent modules are built by threading the end of a tube to tapped spherical node holes, creating standard, alternating, and reduced-depth square or off-set design modules. The 20-page manual illustrates various designs and discusses node and hole orientations coupled with design dimensions and geometric configurations.
Unistrut Corporation
Circle 263 on information card



Models from CADD-Driven Lasers
Stereolithography combines a CADD system and a moving laser beam to build models from photochemically cured liquid plastic within minutes, and without tooling.

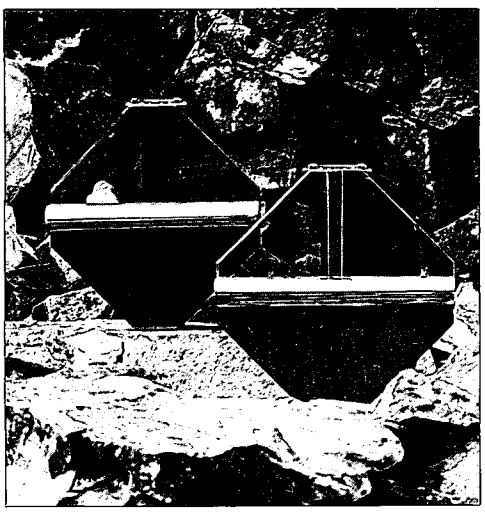
The process, which will be available January 1988, uses ultraviolet light that instantly solidifies liquid plastic. The laser is guided by either solid- or surface-modeling CADD software. By "printing" successive sections of the model on the liquid's surface, a plastic model develops from bottom to top.

When light hits the surface of the photopolymer liquid, it forms a thin solid layer on the surface of the liquid. Stereolithography takes advantage of this phenomenon, printing layers on top of each other to form three-dimensional objects. As the object is lowered on an elevator platform, each cross-section drawn on the surface adheres to the last one until the model is complete. After the model has been completely formed, layer by layer, the finished part is raised from the liquid by the elevator.

The model can be created in various materials and in a variety of colors, hardnesses, and abrasion resistances. The system is capable of making a building story by story to virtually any level of detail desired.
3D Systems Inc.
Circle 260 on information card

Products continued on page 148

Stone-like Paint
Endurastone by Linetec gives exterior and interior aluminum panels and extrusions the look of granite and marble for commercial applications where granite would be too expensive, heavy, or brittle. The granite-like effects are created by spraying up to four different coats of a fluorocarbon coating called Duranar over a base coat. A final coat is added for protection as the material passes through Linetec's automated 900-foot, continuous-loop horizontal spray line. Endurastone is available in black granite, red granite, and Linetec's custom-matched colors, and meets AAMA specification 605.2.
Linetec
Circle 269 on information card



Self-Luminous Signs
Self-luminous exit and other life-safety signs do not require electricity or batteries for illuminating. The signs remain continuously lit, although it is hard to detect any illumination during daylight hours or in brightly lit rooms.

The maintenance-free signs are purported to maintain their illumination up to 20 years by utilizing tritium gas, a low-level isotope of hydrogen, within a hermetically sealed glass tube. The inside surfaces of these tubes are coated with a phosphor, which illuminates when bombarded with electrons emitted by the tritium. To meet safety standards, the tubes are shock-mounted inside a high-impact plastic case, designed to be tamper- and vandal-resistant. A clear, high-impact plastic shield across the face of the sign provides additional protection and serves as another barrier against accidental damage.

The signs are approved by virtually all appropriate code authorities as well as many state and local authorities.
Brandhurst
Circle 259 on information card

Waterproofing Membranes
Plastiwrap 60 membrane is composed of a 56-mil rubberized asphalt waterproofing sheet with a 4-mil black polyethylene film laminated to the outer surface. It can be used on concrete structures for foundation waterproofing, mud slabs, sills, spandrel beams, tunnels, plaza decks, parking garages, and other applications requiring waterproof protection.

Plastiwrap comes in widths from 6 to 48 inches and is supplied in 3x50-foot rolls with release paper on one side (which is stripped before application) to prevent blocking in the rolls. The edges are overlapped by 3 inches and are self-sealing. All membranes should be applied according to specifications provided.
Progress Unlimited
Circle 261 on information card

Drawing Revision Management System
The RevTracker tablet menu is a drawing revision management system to be used in conjunction with the AutoCad drafting package on IBM-compatible personal computers. The system provides the user with screen and plotting access to earlier revisions of a current drawing without leaving the original drawing.

RevTracker displays or plots the drawing revision alone or superimposed for comparison of the current drawing with another revision. The displayed revision is not a slide, so all the AutoCad commands are available for use on the display.

Along with the standard commands, RevTracker has an automated setup for A- through E-size and nonstandard drawings, automatic text scaling, and automated routines to customize both the 500-symbol library and 28 predefined drawing layers. *continued on page 150*

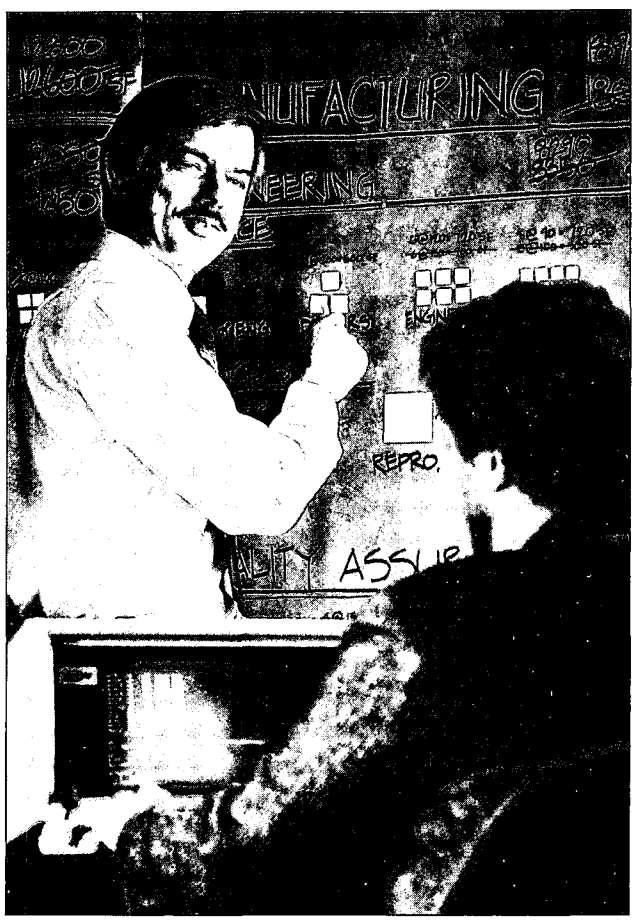
Broaden Your Client Base With Space Forecasting Services!

Space forecasting enables managers to predict what their companies' future space needs will be, and when you offer clients this important service, you establish or strengthen a valuable on-going relationship.

FM:FORECAST is the microcomputer software that lets you provide space forecasting services before a client sees a need for design services and after construction, too.

And, FM:FORECAST has the features you want most:

- It's easy to use—you do space forecasting quickly, following menus that lead you through the complete process.
- It allows "what if" analysis so you can plan for various contingencies by changing only one or two variables.
- It's portable—take it right to the client's office and do the analysis on site.



- It's comprehensive—the software can track detailed information and use a combination of forecasting methods.

Best of all, it's affordable! At $695 ($895 for non-AIA members), FM:FORECAST is the lowest priced space forecasting system around—within the reach of even the smallest architectural firm.

Find out more about FM:FORECAST and how it can broaden your client base and build your profitability. Call toll free **800/424-5080** or return the coupon for an easy-to-use demonstration disk (runs on an IBM PC with 384K RAM) and/or complete information kit.

A MASTERSYSTEMS Software Tool for Facility Forecasting.

I'd like to know more about your space forecasting software.

☐ Send me a demonstration disk and information package on FM:FORECAST. My check for $35, enclosed, will be applied toward my purchase.

☐ Send me only the information package on FM:FORECAST.

NAME _____ TITLE _____

FIRM _____ TELEPHONE ( )

ADDRESS _____

CITY/STATE/ZIP _____

Type of Computer _____ RAM _____

Type of Printer _____

Member:
AIA ☐
IFMA ☐
Other _____

Your Firm:
Architecture ☐
A/E ☐
Engineering ☐
Government ☐
CII Owner ☐
Other _____

MAIL TO:
THE AMERICAN INSTITUTE OF ARCHITECTS
Professional Systems Division Marketing
1735 New York Ave., NW
Washington, DC 20006

FMAJ0987

Circle 62 on information card

Products *from page 148*

The menu works with AutoCad 2.17 and later revisions and requires MS-DOS 3.0 or PC-DOS 3.1. Hard disk, color display, and a minimum 12x12-inch table are also required.
Abacus Consulting
Circle 262 on information card

Updated Stair Catalog
An updated edition of "Quality in Stair Technology" provides a visual and graphic understanding of pre-engineered stairs and systems. The catalog also contains photographs and specifications on railings and drawings and specifications on treads and landings. Although copies will appear in the Sweet's 1987 catalog, the stair catalog is also available free from the manufacturer.
American Stair
Circle 264 on information card

Graphic Plotter
The CADLINER CD-500 minicomputer-based graphic plotter is a compact computer-assisted drafting device that can be used independently on any level surface or attached to the head of a drawing machine. The plotter features a permanent memory with a total capacity of 1500 keystrokes, which can be allocated dynamically for up to 100 addresses; the ability to produce 200 different letters and symbols; a choice of 86 letter sizes; all possible tolerance dimensions, fits and clearances, exponents and indices, etc.; circling of characters; a slanted-letter capability; precision letter spacing; grid spacing for tables and columns; a four-direction lettering capability; and optional typefaces in Helvetica Outline and Helvetica Bold cassettes.
Max Business Machines
Circle 265 on information card

Seal Stains
Color-pigmented water repellents for color-staining concrete and concrete block surfaces penetrate into the masonry surface, providing a uniform color appearance without altering the natural esthetics or texture of the surface.

Sure Klean weather seal stains waterproof the treated surface and is designed not to flake or peel from the masonry surface. This feature provides a long-lasting color appearance. The seal is packaged in six colors, with special colors available for custom color matching.
ProSoCo
Circle 266 on information card

Window Shading System
The patented Trackstar window shading system is a roller shade system that raises and lowers shades to hold at any desired height. Available fabric for the system includes two types of canvas; a sunscreen or super sunscreen in a PVC-coated glass fiber yarn woven into mesh; a fire-retardant vinyl; a sheer-weave or a basket-weave—all available in several colors.

The lifting systems include a motorized lifting system, a manually operated clutch and chain, and a manually operated cord and pulley. A brochure outlines hardware, fabric, and lifting specifications and features recent innovations in hardware and installation engineering such as new lifting systems, redesigned track and bracket, and a new line of eight-ounce canvas.
Castec Inc.
Circle 267 on information card

 Circle 63 on information card Circle 64 on information card

No one in this universe goes further with door frames.

No one, but Curries.

Curries has more standard frame options to choose from than anybody else. In 12, 14, 16, or 18-ga. cold-rolled or galvanealed steel. And 16-ga. stainless steel.

You can order them any way you want. Knocked down. Set up and spot welded. Set up and arc welded. Or set up and full welded.

And Curries custom frames are formed just one way. Your way. They can be assembled and welded by your local Curries distributor. So there's less chance of damage in shipment. And you don't have to put up with costly delays.

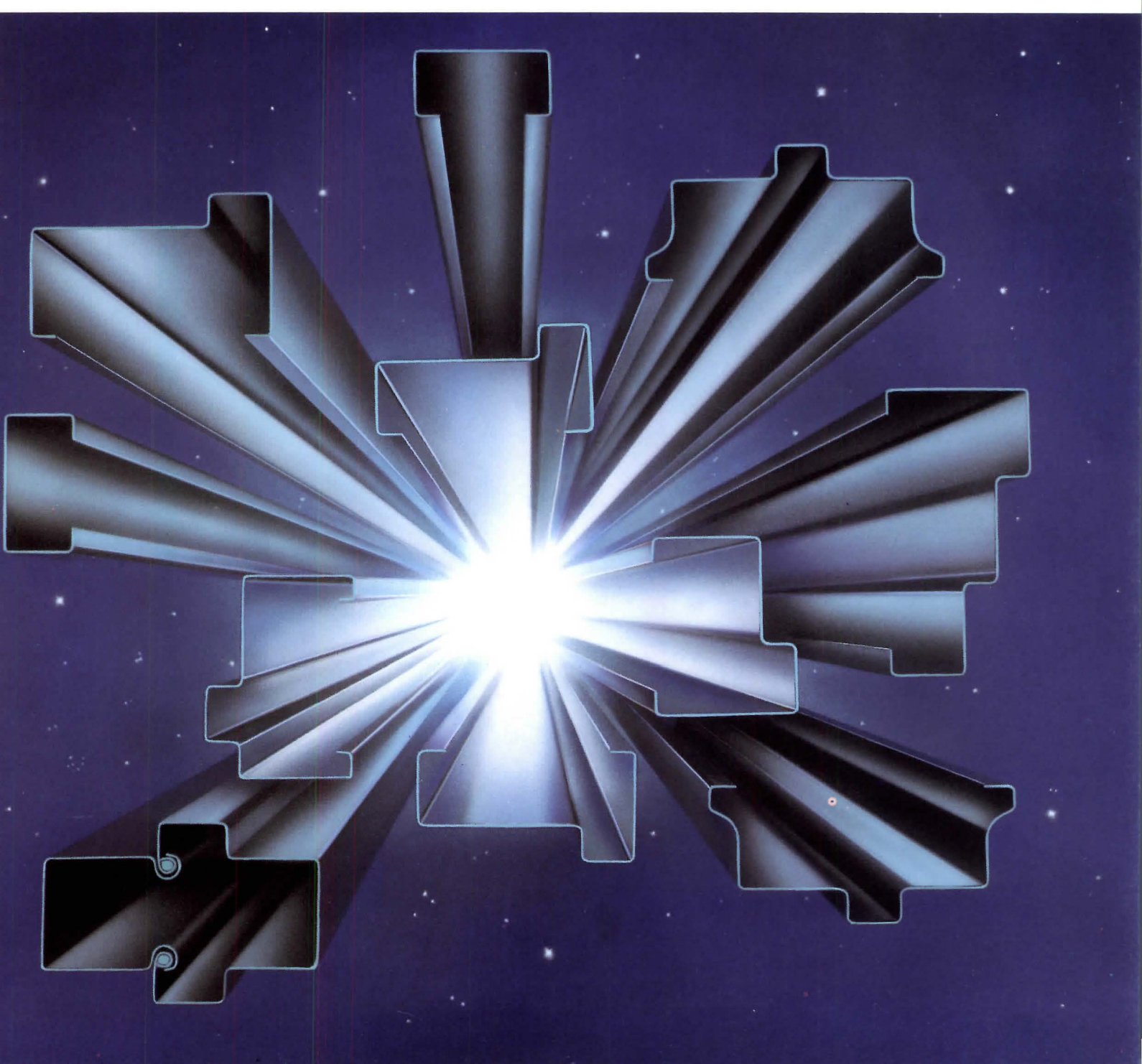
You see, Curries delivers **on time.** So you get what you want. When you want it. Correct. Complete. No excuses.

Call your Curries distributor today. No one goes further to provide you with the **total opening**—doors, frames and finish hardware.

He's in the Yellow Pages under "DOORS" or "DOORS-Metal". Or see Sweet's 8.2 Cur. Curries Company, 905 South Carolina, Mason City, IA 50401.

CURRIES

Circle 66 on information card

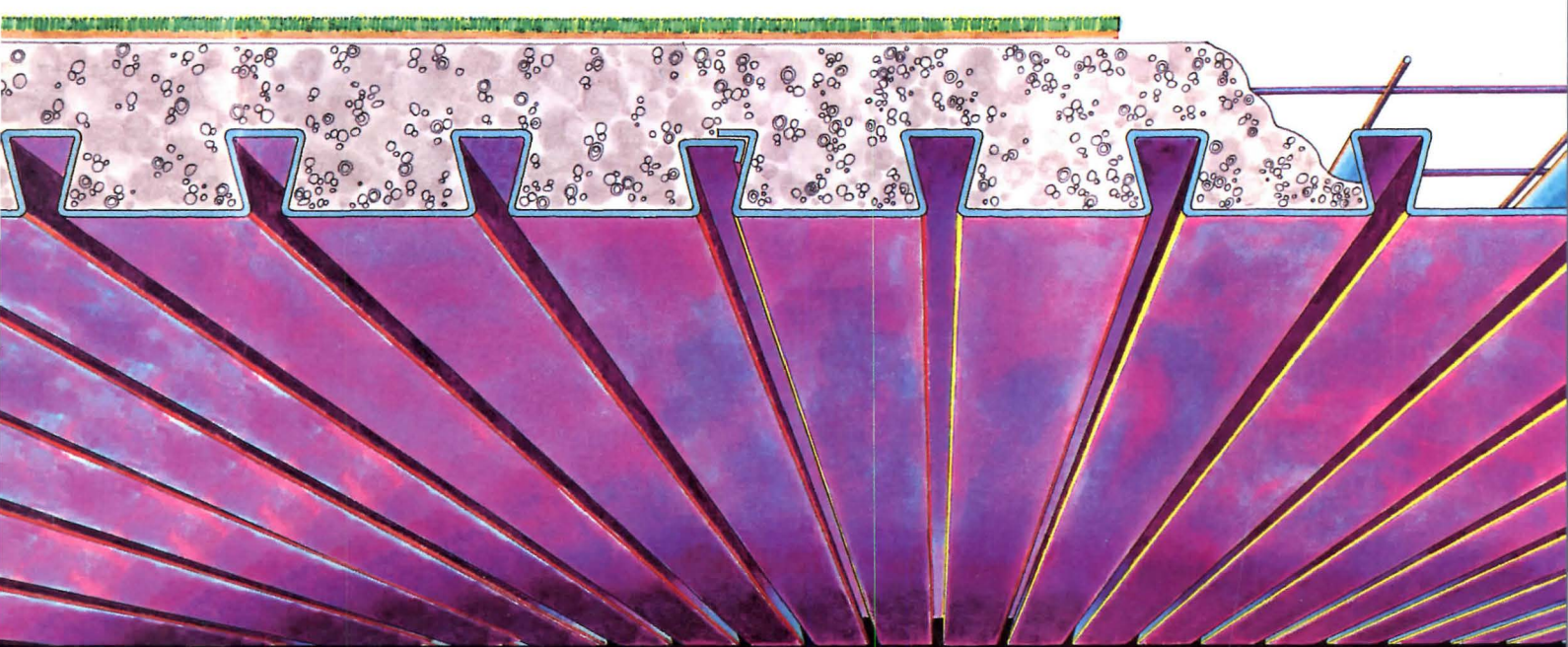


EPICORE®

COMPOSITE FLOOR SYSTEM

Design with a Floor and a Ceiling in Mind!

One of the more versatile products on the market today!



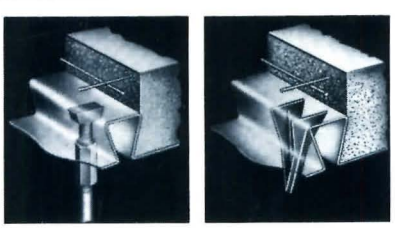
■ HOSPITALS ■ LABORATORIES ■ SCHOOLS ■ OFFICE BUILDINGS ■ AIRPORTS ■ CONVENTION CENTERS ■ HOTELS ■ MOTELS ■ WAREHOUSES ■ UTILITY PLANTS ■ MANUFACTURING FACILITIES

AS A FLOOR...Ideal when there is a need for rearranging loads within a building. Less vibration in floors which can disturb sensitive equipment. Able to sustain the impact of heavy and moving loads.

AS A CEILING...Built-In Hanging Feature allows for overhead changes with a minimum of inconvenience. Exposed and painted with an attractive finish creates a very desirable appearance. Built-In Hanging Feature provides flexibility for interior designing of lighting and other mechanicals.

AS A FLOOR, AS A CEILING...Acoustical roof and floor construction provides optimum in sound absorbing factors.

FOR EVERY TYPE OF BUILDING. *ALL THIS AND MORE.*



HANGING DEVICES

We would be pleased to hear from you.

EPIC METALS CORPORATION

Eleven Talbot Avenue, Rankin PA 1510
PHONE: 412/351-3913
TWX: 710-664-4424
EPICMETAL BRDK

Circle 67 on information card